

## SERVICE MANUAL

Electronic Cash Register

**ECR-238**



(PHOTO : ECR-238)

PRODUCTION CODE No.		
ECR-238	(U.S.A)	1 945 624 00
	(CANADA)	1 945 624 05
	(GENERAL)	1 945 624 20
	(GERMANY)	1 945 624 25

SPECIFICATION	Model name		ECR-238	
	Number of department		Max. 10	
	Number of PLUs/Subdepartment		Max. 330	
	Memory Protection Memory holding time		Built-in rechargeable Ni-Cd battery 1,000 hours with fully recharged battery at room temperature	
	Display	Type Operator *Customer	Green fluorescent display tube 9-digit numeric 9-digit numeric	
	Printer	Type Character Printing Speed	Receipt and Journal Printer (2-station) 13 characters/line approx. 2.5 lines/sec.	
	Paper Roll	Type Size	High-quality register-use roll paper 57.5 ± 0.5 mm (W) X max. 80 mm (φ)	
	Keyboard	Type Key position	Stroke type max. 35 keys	
	Power supply		AC 120V ± 10 %, 50/60 Hz AC 230V ± 10 %, 50/60 Hz	
	Power consumption		46 W	
	Operating Temperature		0 to 40 °C (32 °F to 104 °F)	
	OVERALL DIMENSION			405 (W) × 437 (D) × 276 (H) mm (including drawer height : 113 mm)
	WEIGHT	Terminal with Drawer		11.0 kg (including drawer weight : 7 kg)

\*The mark (\*) shows the factory option.

\*\*The specification and equipment are subject to change without notification by the manufacture.

REFERENCE NO. **SM** 620042

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## **1. MACHINE RECOGNITION**

### **1-1. POWER SUPPLY**

This machine has no power switch, the only way to remove power is disconnect the machine from the main power supply. Even after it disconnected, the VCM voltage can still be presented by the Lithium battery to keep the all contents in the RAM (Random Access memory). Thus during the installation, do not short the circuit on the Main PCB.

#### **CAUTION :**

**The AC power will be supplied from the AC outlet even if the mode lock SWITCH is "OFF" position.**

### **1-2. BATTERY REPLACEMENT**

This machine has equipped with the Ni-Cd battery to keep the contents of memories. At the time of battery replacement, it must be replaced as follows.

#### **Ni-Cd BATTERY :**

**MODEL :** 3N-50AAAS (Service Parts Code ; 632 755 1867)

**MANUFACTURE :** Sanyo Electric Co., Ltd.

**RATING :** 3.6V, 45 mAH

### **1-3. PROTECTIVE EARTH**

There are couple of grounding wires to protect from the miss operation or damage generated by incoming noise or static electricity.

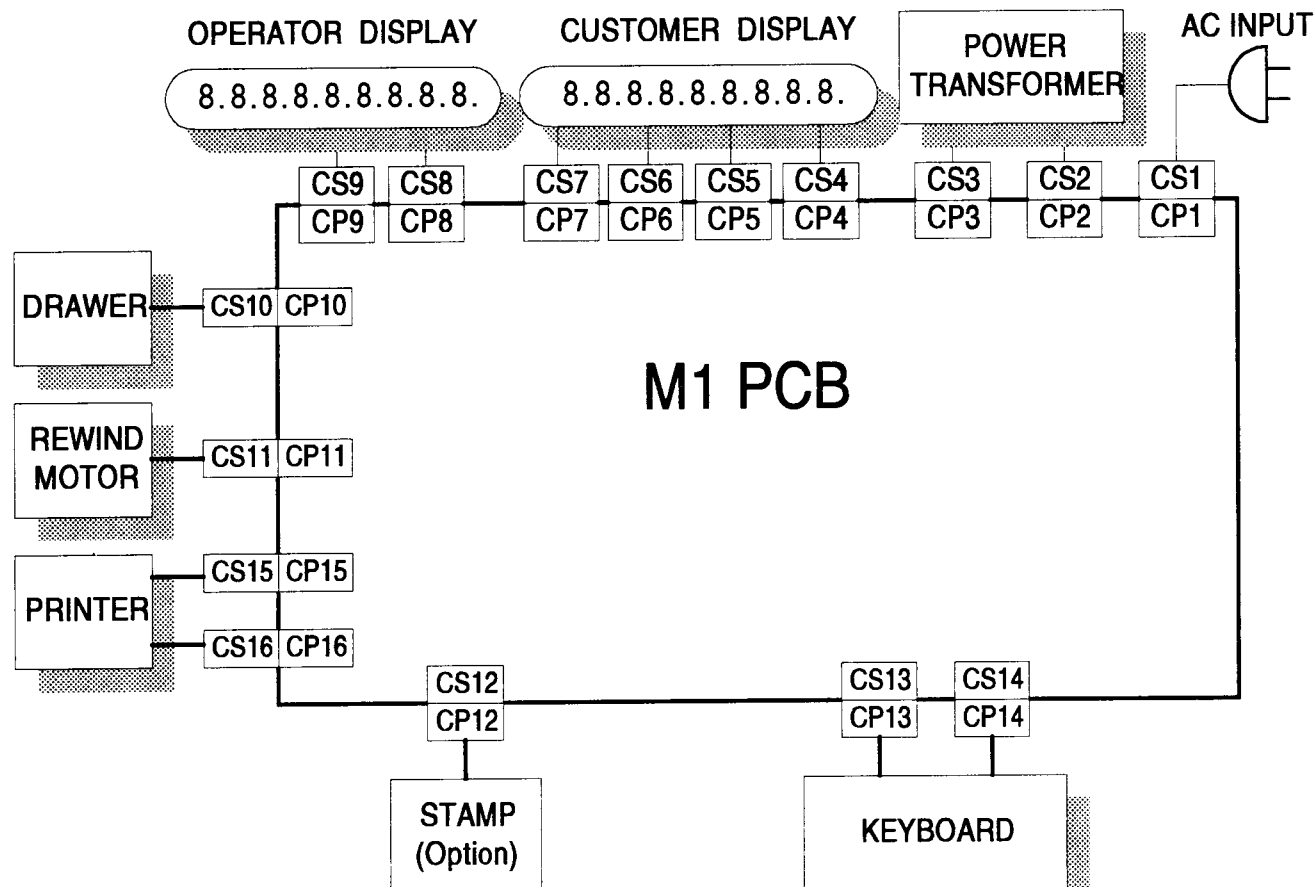
All of the grounding wires should connect firmly as they were originally assembling after repairing.

#### **IMPORTANT :**

As the circuits consists of many ICs, please handle with care. Electrostatic discharge to the PCB may give damage to the circuit.

So discharge your electric charge before handling PCBs.

## 2. CONNECTION DIAGRAM



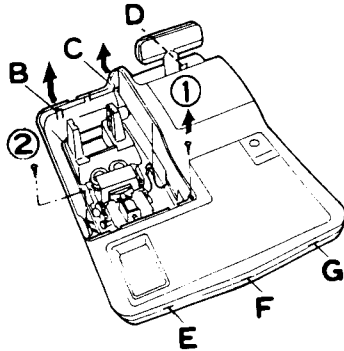
### 3. PIN-OUT DIAGRAM

CP1/CS1	CP6/CS6	CP9/CS9	CP13/CS13	CP14/CS14	CP16/CS16
1 AC LINE	1 G4	1 4G	1 M1 [PF]	1 NC	1 GND
2 AC LINE	2 G3	2 3G	2 T8	2 NC	2 GND
	3 G2	3 2G	3 T0	3 NC	3 PT
CP2/CS2	4 G1	4 1G	4 T1	4 T3' [P]	4 VCC
1 AC LINE	5 VLL	5 P4	5 T2	5 T4' [Z]	5 M
2 NC		6 P8	6 T3	6 T5' [M]	6 HCOM
3 AC LINE		7 P3	7 T7	7 T6' [X]	7 NC
	CP7/CS7	8 P2	8 T6	8 NC	8 #13
	1 P8	9 P1	9 T4	9 M1 [C]	9 #12
CP3/CS3	2 P3	10 NP	10 T5	10 NC	10 #11
1 AC LINE	3 P2	11 F2	11 T0 [PF]	11 NC	
2 AC LINE	4 P1	12 F2	12 NC	12 K0	
	5 NP		13 NC	13 K1	
	6 F2	CP10/CS10	14 K3	14 K2	
CP4/CS4	7 F2	1 VPP			
1 VF1	CP8/CS8	2 DRA		CP15/CS15	
2 SF	1 F1	3 NC		1 #10	
3 SG	2 F1	4 DRASW		2 #9	
4 SE	3 NP	5 GND		3 #8	
5 SD	4 P6			4 #7	
6 G9	5 P7	CP11/CS11		5 #6	
7 G8	6 P5	1 RWD		6 #5	
	7 NC	2 VPP		7 #4	
CP5/CS5	8 9G			8 #3	
1 G7	9 8G	CP12/CS12		9 #2	
2 G6	10 7G	1 VPP		10 #1	
3 G5	11 6G	2 STAMP		11 NC	
4 NC	12 5G			12 RD	

## 4. OPENING / ASSEMBLING THE UNIT

### 4-1. OPENING THE CABINET

- Disconnect the AC cable.
- Pull and lift the printer cover.
- Unscrew the screw-① and -②.
- Pull the customer display up.
- Take the three (3) hooks-(B), -(C), and -(D) off by pushing the top cabinet to backward.
- Hold the both sides of top cabinet, and then lift the rear edge up.
- Horizontally slide the top cabinet to front side, and then take the three (3) hooks-(E), -(F), and -(G) off.

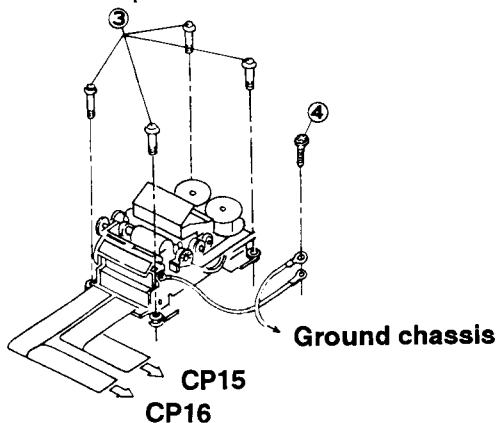


### 4-2. REMOVING THE PRINTER

- Open the cabinet.
- Unscrew the screw-③ which are secured the printer to bottom cabinet.
- Unscrew the screw-④ which is secured the ground wire to bottom cabinet.
- Carefully remove the cables connected to M1 PCB.

★ Refer to **DISCONNECT THE CABLE**.

- Take out the printer.



### 4-3. REMOVING THE KEYBOARD

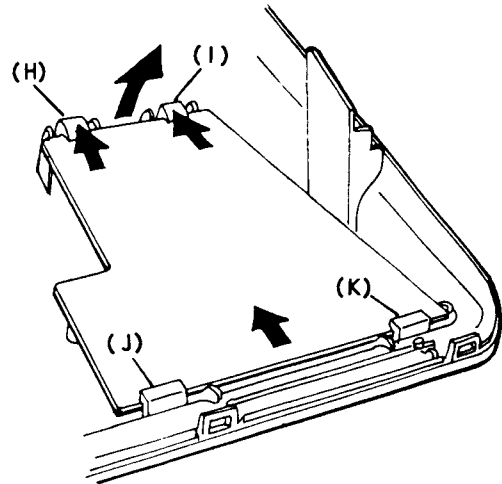
- Open the cabinet.
- Lift the keyboard, and then remove the flat cables from the connector.

★ Refer to **DISCONNECT THE CABLE**.

- Take out the keyboard.

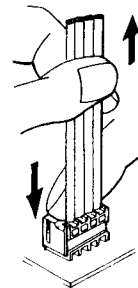
### 4-4. REMOVING THE M1 PCB

- Open the cabinet.
- Remove the keyboard.
- Disconnect the all cables from M1 PCB.  
★ Refer to **DISCONNECT THE CABLE**.
- Push the hook-(H) and (I) to backward, and then lift the M1 PCB.
- Remove the M1 PCB from the hook-(J) and (K).



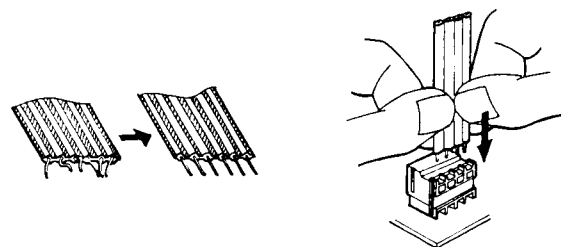
### DISCONNECT THE CABLES

- Push the connector cover down with even pressures.
- Hold the jumper cable and pull it up straight.  
(The cable will not removed if the whole cover was not pressed uniformly)



### CONNECTING THE CABLES

- Align the cable pins straight with even span.
- Insert the pins straight to connector until it stopped and then check the all pins will not see.
- Lightly pull the cable and make sure it held tightly.

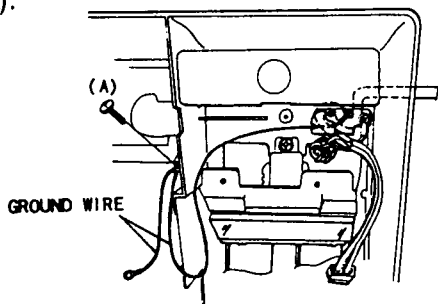


## 4-5. ASSEMBLING THE UNIT

The unit should be assembled by simply reverse the disassembling steps, taking care not to damage any cables.

### GROUND WIRE

Ground wires are connected as following figure. To avoid the damage of the static electricity or to protect against the noise interference, these two ground wires must be connected to the drawer by screw-(A).



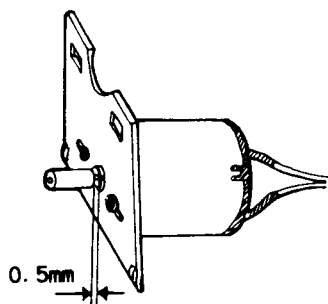
### SPECIAL INSTRUCTION

#### ① CABLE/WIRE FORMING

Any cables or wires especially for operator and customer display cable must be formed far from the power transformer, because of the safety standards or the protection against the noise interference.

#### ② CLEARANCE FOR THE REWIND MOTOR

The shaft of rewind motor for journal paper has attached the spacer. For smooth paper winding, the clearance between the motor and spacer is 0.5 mm.



#### ③ MICRO SWITCH FOR THE DRAWER

When the machine will be attached the drawer without the micro switch, the Short circuit jumper wire must be installed between No. 4 pin and No. 5 pin of connector CP10.

(Drawer with micro switch)	(Drawer without micro switch)
CP10	CP10
1 — Solenoid	1 — Solenoid
2 — Solenoid	2 — Solenoid
3 — Ground (NC)	3 — Ground (NC)
4 — Sensor switch	4 — short circuit jumper wire
5 — Sensor switch	5 — short circuit jumper wire

## 5. MACHINE INITIALIZE

There are two (2) types of recover methods from the machine interlocking and several methods for machine initialize are available.

- ① : HARD RESET  
 ② : EMERGENCY RESET  
 ③ : I.P.L (Initial Program Loading)  
 ④ : Auto-Loading Key layout  
 ⑤ : GT's and Z counter Initialize  
 ⑥ : RESET (Z) report

Data to be cleared	①	②	③	④	⑤	⑥
All data in the RAM	○	○	—	—	—	—
Customized key layout	○	△	△	△	×	×
Current Date and Time	○	×	○	×	×	×
Programming Data	○	×	△	×	×	×
GT's and Z counters	○	×	○	×	○	×
Sales data (Total & Counter)	○	×	○	×	×	○

○ : Data will be cleared to Zero.

△ : Data will be changed to pre-programmed data.

× : Data will not affect.

### ① HARD RESET

Even after the AC power is disconnected, the VCM voltage can still be supplied by the Ni-Cd battery to holding the contents of memory. When the AC power is recovered, normally RESET signal will not generate from the reset circuit (IC8), because of the VCM keeps over +2.4 V. In other words, the VCM voltage must be under +1.2 V to generate the RESET signal for CPU (IC1).

Note : VCM = +1.2 V ~ +2.4 V (transiting level)

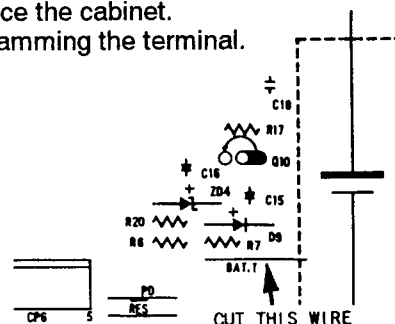
The following operations is explained enforced generation of RESET signal.

#### ● HARD RESET OPERATION

- (1) Unplug the machine from AC outlet.
- (2) Removing the cabinet.
- (3) Cut the Jumper wire marked "BAT·T" on the M1 P.C.B located near the symbol mark of Ni-Cd battery.
- (4) Check the VCM if the voltage is under +1.2 V. If not, make a short circuit between VCM and GND line by a tweezers.
- (5) Plug in the terminal and make sure that the printer will move for a moment.
- (6) Solder the "BAT·T" wire again.

**ATTENTION :** Do not short any other circuit, because the AC power is supplied.

- (7) Replace the cabinet.
- (8) Programming the terminal.



## ② EMERGENCY RESET

When the Interlocking (such as no key entry) is happened, please try the following operations.

- Unplug the machine from the AC power.
- Turn the mode lock to the "P" position.
- While depressing the [Paper Feed] key, plug the machine to AC outlet.
- Check the machine if the interlocking is released.
- Reprogram the associated items.

## ③ I.P.L (Initial Programming Loading)

Before using the register, it should first initialize the total that memory and programming area currently contained in memory, including the key codes. After initialization, the machine will load the pre-programmed data into memory.

### Key Sequence

<P mode>

55--[ST ALL]--XX--[#/NS] ... Tax mode

99--[ST ALL]--XX--[#/NS] ... Tax mode (for CANADA)

99--[ST ALL]--XX--[#/NS] ... Non-Tax

XX : machine number (0~99)

If you have not programmed the machine number yet, please enter one (1) as machine number.

## ④ AUTO LOADING KEYBOARD

After the memory initialisation, you must utilize the following procedures to assign the pre-programmed key codes on the keyboard.

### Key Sequence

<P mode> 44--[ST ALL]--XX--[#/NS]

XX : machine number (0~99)

## ⑤ GT's & Z Counter INITIALIZATION

You can initialize the Grand Total memory and Z counters through the following procedures.

### Key Sequence

<P mode> 88--[ST ALL]--XX--[#/NS]

XX : machine number (0~99)

Note : Grand Total has two separate memories.

Grand Total 1 = Sales Department Total

- + Tax Total
- + Void Total
- + Received-on-Account total
- + Paid Out Total
- + Amount Discount Total
- + Percent Discount Total
- + Percent Mark-up Total
- + Refund Total

Grand Total 2 = GROSS SALES

= NET SALES + TAX COLLECTED

## ⑥ RESET (Z) TOTAL

If you want to look at the data and reset the totals and counters to zero, you would follow the procedure utilizing the Z mode.

Report Name		Operation
General Report	DAILY	[CASH]
	PERIODIC	ID code [CASH]
PLU Report	ALL	[PLU]
Hourly Daily Total Report		[CHEQUE]

# Pre-Programmed Data

	Tax mode	No-Tax mode
Initial program loading AB [ST ALL] <u>XX</u> [# /NS] ↳ Machine No.	A B 5 5	A B 9 9
Key layout Loading AB [ST ALL] <u>XX</u> [# /NS] ↳ Machine No.	A B 4 4	A B 4 4
Grand Total/Z-counter initialization 88 [ST ALL] <u>XX</u> [# /NS] ↳ Machine No.	GT1 = 0 GT2 = 0 ZC = 0	GT1 = 0 GT2 = 0 ZC = 0
Percent(%1,%2)Rate <u>XXXXX</u> [%1,%2] ↳ Percent Rate X 1000	0 %	0 %
Receipt number 3 [ST ALL] <u>XXXX</u> [# /NS]	XXXX = 0	XXXX = 0
Report ID Code & Machine No. 4 [ST ALL] ABCD [# /NS]	A B C D 0 0 0 1	A B C D 0 0 0 1
Machine Size Setting 10 [ST ALL] ABCD [# /NS]	A B C D 0 0 8 2	A B C D 0 0 8 2
Print selection 1 [ST ALL] ABCDEF [# /NS]	A B C D E F 0 1 0 0 0 0	A B C D E F 0 1 0 0 0 0
System Programming 2 [ST ALL] ABCDEFG [# /NS]	A B C D E F G 0 0 0 3 0 0 4	A B C D E F G 0 0 0 3 0 0 4
Tax Rate	7 %	0 %
DEPARTMENT		
1 [ST ALL] ABCD [DEPT.] [# /NS]		
	A B C D	A B C D
DEPT. 1~DEPT. 4	0 1 1 5	0 0 1 5
DEPT. 5~DEPT. 8	0 0 1 5	0 0 1 5
PLU 1 [ST ALL] <u>XXX</u> [PLU] A [DEPT.] ↳ PLU code	A 8	A 8
CASH,CHECK,CHARGE 1 [ST ALL] ABC [Key] [# /NS]	A B C 0 1 7	A B C 0 1 7
MNTX/TXST,RECD ACCT,RFND, PAID OUT,- /NET ST 1 [ST ALL] ABC [Key] [# /NS]	A B C 0 1 7	A B C 0 1 7
Cheque cashing limit 2 [ST ALL] AB [CHEQUE] [# /NS]	A B 1 7	A B 1 7
Currency Conversion <u>N</u> [RECD ACCT] AB [# /NS] ↳ Foreign currency No.	A B 0 2	A B 0 2



## 6. CUSTOMIZING KEYBOARD

### 6-1. Typical keyboard layout

#### ● Type 1 (English)

VOID			SHIFT 1		— NET ST		%		1	
------	--	--	------------	--	-------------	--	---	--	---	--

↑	7	8	9	4	8	RECD	PAID
@/FOR	4	5	6	3	7	ACCT	OUT
TIME	1	2	3	2	6	#	CHARGE
PLU	0	00	.	1	5	NS	CHEQUE
CLEAR						ST	
						ALL	
						AMT TEND	
						CASH	

#### ● Type-2 (German)

STORNO		SHIFT 1		NETTO -ZW		%	

↑	7	8	9	4	8
X UHR	4	5	6	3	7
PLU	1	2	3	2	6
LÖSCHEN	0	00	.	1	5

EIN- ZAHLUNG	AUS- ZAHLUNG
# KV	KREDIT
ZW	SCHIEK
-SUMME	
BAR	

#### ● Type-3 (French)

		NUL		S/TAXE 1		REMISE NET ST		%		1	
--	--	-----	--	-------------	--	------------------	--	---	--	---	--

↑	7	8	9	4	8	R/A	S/A
X	4	5	6	3	7	#	CREDIT
HEURE	1	2	3	2	6	S.VENTE	CHEQUE
CODE	0	00	.	1	5	S/TOT	
CORR						ESPECES	

#### ● Type-4 (Spanish)

	ANUL	DERIV 1	— ST NET	% 1
--	------	------------	-------------	--------

↑	7	8	9
@/POR HORA	4	5	6
PLU	1	2	3
CCION	0	00	.

4	8
3	7
2	6
1	5

REC. ACTA	PAGOS
# NV	CR
ST+IM	CHEQUE
CAJA	

### 6-2. Assign the new-key code to keyboard

#### Key Sequence

<P mode>

1111 -- [ST ALL] -- nn -- [KEY] -- [#NS]

nn : key code. (See Key Code Table)

[KEY] : Press the key on the keyboard that you will assign it to.

NOTE : The following keys will keep the original key position with their functions even after assigned to any other places.

\*Numeric keys, \*CLEAR key, \*Paper feed key

#### KEY CODE TABLE

Each key on this terminal's keyboard and optional keys are identified by a number shown below:

KEYBOARD CHARACTER	CODE	KEYBOARD CHARACTER	CODE	KEYBOARD CHARACTER	CODE
1	01	*	23	PLU	45
2	02	*	24	*	46
3	03	*	25	*	47
4	04	DPT. RFND	26	*	48
5	05	GEN RFND	27	*	49
6	06	VOID	28	*	50
7	07	*	29	DEPT.1	51
8	08	MNTX/TXST	30	DEPT.2	52
9	09	*	31	DEPT.3	53
0	10	-/NET ST	32	DEPT.4	54
00	11	*	33	DEPT.5	55
.	12	% 1	34	DEPT.6	56
CLEAR	13	% 2	35	DEPT.7	57
#/NS	14	RECD ACCT	36	DEPT.8	58
ST ALL	15	PAID OUT	37	DEPT.9	59
@/FOR/TIME	16	*	38	DEPT.10	60
RECPT OFF/ON	17	*	39	*	61
ELR	18	*	40	*	62
SHIFT 1	19	*	41	*	63
SHIFT 2	20	CHARGE	42	*	64
SHIFT 3	21	CHEQUE	43	*	65
*	22	CASH	44		

NOTE : Code No.1~13 are not relocatable keys.

### 6-3. Disable the key on the keyboard

#### Key Sequence

<P mode>

1111 -- [ST ALL] -- 0 -- [KEY] -- [#NS]

[KEY] : Press the key on your keyboard that you want to disable.

## 7. SELF DIAGNOSTIC

### Key Sequence

<P mode>

(77)--ST ALL--(Machine number)--[#/NS]

- (AUTO) (1) Display Check  
| All figures will be displayed. Make sure the all digits and segments are displayed.
- (AUTO) (2) RAM Check  
| The RAM check result will be printed out. (See bellows receipt sample)
- (AUTO) (3) Printing Check  
| All internal characters will be printed out. (See bellows receipt sample)
- [ST ALL] — (4) Mode lock Check.  
Turn the mode lock position from P to Z, M, X, R and OFF.

- [ST ALL] — (5) Key-code Check.  
Press any key except "#/NS", and "↑" key. Display shows the key-code that has been programmed. (See "Keyboard Programming")

- [#/NS] (6) Drawer open Check and terminate this routine.

7 7★★★★No												
★	·	9	8	7	6	5	4	3	2	+	@	
0	★	·	9	8	7	6	5	4	3	-	+	
1	0	★	·	9	8	7	6	5	4	%	-	
2	1	0	★	·	9	8	7	6	5	◇	%	
3	2	1	0	★	·	9	8	7	6	TX	◇	
4	3	2	1	★	·	9	8	7	#	TX		
5	4	3	2	1	0	★	·	9	8	V	#	
6	5	4	3	2	1	0	★	·	9	CA	V	
7	6	5	4	2	1	0	★			CH	CA	
8	7	6	5	4	3	2	1	0	No	CG	CH	
9	8	7	6	5	4	3	2	1	0	T	CK	
-	9	8	7	5	4	3	2	1	0	T		
★	·	9	8	6	5	4	3	2	1	@		

... RAM check result  
(77 : O.K.)

## 8. ERROR CODE & MESSAGE

The machine will inform you with the following error message on the display.

ERROR CODE	ERROR CAUSE
E0 Input Capacity Over	* Is the figure entered over the capacity ? Function and Tendering key Max.8 digits Department key Max.7 digits Multiplication * Quantity Max.5 digits * Unit price Max.7 digits * Product Max.7 digits Split pricing * Package quantity Max.2 digits * Purchased quantity Max.2 digits
E2 Entry limit over	* Is the amount entered over the entry limit programmed ?
E3 Operation error	* The improper operation. * Please read this instruction manual again.
E4 Compulsory error	* Did you enter an amount before depression the key ? * Did you depress [ST ALL] key before the tendering key ? * Did you close the drawer when operating ?
E5 Amount overflow or Negative error	* Is the amount entered over the display ? * Customer total Max.8 digits * Discount total > Customer total * Previous item void > Customer total
E6 Prohibited operation by programming	* Is the key allow to operate in the R mode ? * Did you enter the correct Report ID mode ? * Did you enter the correct machine number ? * Did you program the prohibit status ? * Is the times over the programmed limit ? (Delayed receipt)
E7 Mode error	* Is the mode lock placed properly ? * Did you complete the previous operation ?

NOTE : If only certain key operation results in an error, it may be related to your programming. Please confirm the programming of the associated key.

## OTHER PROBLEMS

Please check the following items before calling for service.

Problems	Check points
The display does not show up in other than OFF position.	<ul style="list-style-type: none"> <li>* Is power distributed to the outlet ?</li> <li>* Is the AC plug connected firmly to the outlet ?</li> </ul>
The drawer does not open.	<ul style="list-style-type: none"> <li>* Did you unlock the drawer ?</li> </ul>
No Receipt is issued.	<ul style="list-style-type: none"> <li>* Is the Receipt paper installed properly ?</li> <li>* Is the Receipt OFF/ON key in the OFF position ?</li> <li>* Is there any paper jam ?</li> </ul>
Printing is indistinct	<ul style="list-style-type: none"> <li>* Is the ink ribbon installed properly ?</li> <li>* Is the ink ribbon worn out ?</li> </ul>
The Logo Stamp is indistinct	<ul style="list-style-type: none"> <li>* Is the Logo Stamp installed properly ?</li> <li>* Is the ink of Logo Stamp worn out ?</li> </ul>
No Confirmation tone is generated when depressing the numeric key.	<ul style="list-style-type: none"> <li>* Did not you program "tone generate" to be OFF ?</li> </ul>
Interlock due to programming	<ul style="list-style-type: none"> <li>* Interlock may occur by improper programming. In this case, the machine may recover as per the following operation.</li> <li>(1) Remove the AC plug from the outlet.</li> <li>(2) Turn the Mode lock to the P position.</li> <li>(3) Connect the AC plug to the outlet again while depressing the Paper Feed keys both about in one second.</li> <li>(4) Confirm the associated programming.</li> <li>(5) Reprogram the associated items correctly.</li> </ul>

## OPTION

You can use the different key size such as a single-size, double-sized or quadruple-size at any position on your keyboard except for paper feed key, clear key and numeric keys. If you need further information for these optional keys, please ask your local dealer.

### Optional key Installation

#### (1) Single-sized key

1. Put the coil spring on the housing.
2. Install the key top, keysheet and key cap.

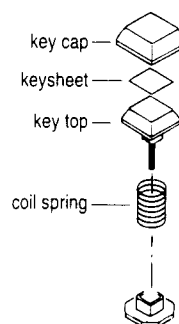
#### (2) Double-sized key

1. Put the coil spring and key top guide on the housing.
2. Install the key top, keysheet and key cap.

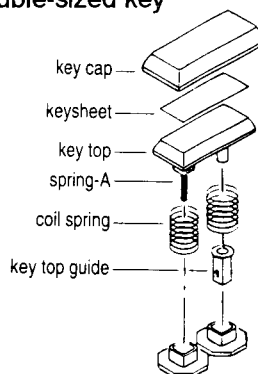
#### (3) Quadruple-sized key

Install the same procedures (2).

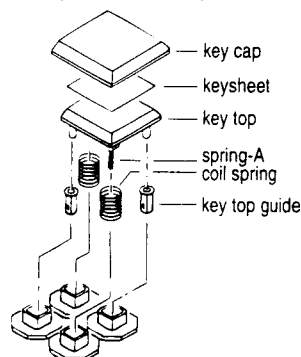
#### (1) Single-sized key



#### (2) Double-sized key



#### (3) Quadruple-sized key



### Precaution for change the keys

When you change the key size, make sure the active spring-A is in correct position.

## 9. PROGRAMMING

### DATE AND TIME SETTING

#### Key Sequence

<P mode>

(A) (XXXXXX)--[@/FOR/TIME]--(B) (XXXXXX)--[@/FOR/TIME]

A=Date format (0~2)	B=Time format (0~2)
A=0: MM DD YY	B=0: *24-hours system
A=1: DD MM YY	B=1: A.M of 12-hours system
A=2: YY MM DD	B=2: P.M of 12-hours system

- (1) To print the date in the order of month, day and year:  
Enter zero (0), and then enter a six-digit number (MMDDYY)  
ex. April 30, 1999 ... 043099
- (2) To print the date in the order of day, month and year:  
Enter one (1), and then enter a six-digit number (DDMMYY)  
ex. 30 April, 1999 ... 1300499
- (3) To print the date in the order of day, month and year:  
Enter two (2), and then enter a six-digit number (YYMMDD)  
ex. 1999, April, 30 ... 2990430
- (4) \*24-hour mode means that the hour after noon go from "13" to "24".  
ex) 9:30 A.M 24 hour mode ... 0093000  
12 hour mode ... 1093000  
9:30 P.M 24 hour mode ... 0213000  
12 hour mode ... 2093000

### RECEIPT NUMBER SETTING

A maximum four digit number can be programmed as the starting receipt number. Each time you take a Z-report, the next receipt starts from the number programmed here, or it continues per programming. (SYSTEM PROGRAMMING, item D)

#### Key Sequence

<P mode>

(3)--ST ALL--(XXXX)--[#/NS]--[#/NS]

xxxx : Initial Receipt Number (0000~9999)

ex. : Receipt number=500

3 [ST ALL] 500 [#NS] [#NS]

### REPORT ID CODE AND MACHINE NUMBER

A two-digit ID code and a two-digit machine number can be programmed. ID code is used to take periodic terminal reports and GT (Grand Total) for security purpose.

#### Key Sequence

<P mode>

(4)--ST ALL--(ABCD)--[#/NS]--[#/NS]

AB : ID code (00~99)

CD : Machine number (00~99)

### PERCENT RATE SETTING FOR % KEY

A preset percent rate can be programmed to percent keys (%1, %2). A percent key [%1] can be positive for mark-up or negative for discount operation depending on programming.

#### Key Sequence

<P mode>

(XXXXX)--[%1, %2]

XXXXX = Percent rate x 1000

ex) 10.5% for [%1] → 10500 [%1]

### MACHINE SIZE SETTING

#### Key Sequence

<P mode>

(10)--ST ALL--(A B C D)--[#/NS]--[#/NS]

A= +8	Five Rappen rounding mode	+8= Five Rappen mode
+4	Norway rounding mode	+4= Norway rounding
+2	GST rounding in Canada	+2= GST rounding
+1	GST rounding in Canada (Gross mode)	+1= Gross GST mode
B= +8	Australia rounding mode	+8= Australia rounding
+4	GST in Singapore mode	+4= GST in Singapore
+2		
+1	Use the terminal as 10-department	
C= 1-9	Selection of maximum Department number ※ In case of 10-department, the following selection is required. B=+1, C=0	
D= 0-3	Decimal position for Print & Display 0 : DP=0 1 : DP=1 2 : DP=2 3 : DP=3	

### PRINT LINE ELIMINATION

#### Key Sequence

<P mode>

(1)--ST ALL--(A B C D E F)--[#/NS]--[#/NS]

A= +4		
+2		
+1	Journal mode/Receipt mode	+1= Journal mode, +0= Receipt mode
B= +4	Department section on General report	+4= non zero skip, +0= zero skip
+2	PLU report	+2= non zero skip, +0= zero skip
+1	GT (Grand Total) line on Daily Z report	+1= non print, +0= print
C= +4	Department Refund on report	+4= non print, +0= print
+2	Transaction Void on report	+2= non print, +0= print
+1	Void on report	+1= non print, +0= print
D= +4	% rate line on receipt/journal	+4= non print, +0= print
+2	PLU line on receipt/journal	+2= non print, +0= print
+1	Subtotal line on receipt/journal	+1= non print, +0= print
E= +4		
+2	Time on receipt/journal	+2= non print, +0= print
+1	Date on receipt in R & M mode	+1= non print, +0= print
F= +4	Tax total line on receipt/journal	+4= non print, +0= print
0-3	Number of delayed receipt issuing	

## SYSTEM PROGRAMMING

### Key Sequence

<P mode>

(2)--ST--(A B C D E F G)--[#/NS]--[#/NS]

A= +4		
+2		
+1	Mark-up amount affects the taxable total	+1= affect, +0= not affect
B= +4	[@/FOR/TIME] key works as square key	+4= Yes, +0= No
+2	Split pricing rounding	+2= round off, +0= round up
+1	Tax1, Tax2, Tax3 on receipt/journal	+1= non print, +0= print
C= +4	[RECD ACCT] key works on credit card mode	+4= Credit Card key, +0= Currency Conversion key
+2	*Drawer must be closed to start transaction	+2= must be closed, +0= none
+1	Cash in drawer declaration compulsory in Z mode	+1= compulsory, +0= option
D= +4	Beep tone for numeric key entry	+4= Off, +0= On
+2	[%1] key works as mark-up key	+2= Yes, +0= No
+1	Receipt number starts from programmed number after taking Z-report	+1= Yes, +0= No
E= +4	Negative amount purchased	+4= in M mode only, +0= allowed in R
+2	Zero (0) entry for department	+2= in M mode only, +0= allowed in R
+1	% discount operation	+1= in M mode only, +0= allowed in R
F= +4	Department Refund operation	+4= in M mode only, +0= allowed in R
+2	General Refund operation	+2= in M mode only, +0= allowed in R
+1	Amount discount operation	+1= in M mode only, +0= allowed in R
G= +4	Transaction void operation	+4= in M mode only, +0= allowed in R
+2	Void operation	+2= in M mode only, +0= allowed in R
+1	Currency conversion & Credit card	+1= in M mode only, +0= allowed in R

NOTE\* : A switch to detect the status of drawer may be provided by option.

## DEPARTMENT PROGRAMMING

### STATUS

### Key Sequence

<P mode>

(1)--ST ALL--(A B C D)--[DEPT.]--[#/NS]

A= +4		
+2	Amount entry is compulsory	+2=Compulsory, +0= Optional
+1	Single item cash department	+1= Yes, +0= No
B= +4	Tax rate 3 is charged	+4=Charged, +0=Not Charged
+2	Tax rate 2 is charged	+2=Charged, +0=Not Charged
+1	Tax rate 1 is charged	+1=Charged, +0=Not Charged
C= 0-9	Most significant digit of entry limit	
D= 0-9	Number of subsequent 0's of entry limit	

\*item A = 5 ... can not program

\*In case of CD = 42 ...  $4 \times 10^2 = 400$  (i.e. 399 max)

### UNIT PRICE

### Key Sequence

<P mode>

(2)--ST ALL--(@@@@@@)--[DEPT.]--[#/NS]  
(@@@@@@) : Unit price (Max. 6-digits)

## PLU PROGRAMMING

### STATUS

### Key Sequence

<P mode>

(1)--ST ALL--(XXX)--[PLU]--(A)--[DEPT.]--[#/NS]  
XXX : PLU code (1~330)  
A : PLU status

A= +8	Not used PLU	+8= Not used
+4		
+2		
+1	Sequential group total flag	+1= Group flag, +0= Normal

### UNIT PRICE

### Key Sequence

<P mode>

(2)--ST ALL--(XXX)--[PLU]--(@@@@@@)--[DEPT.] [#/NS]  
XXX : PLU code (1~Max. 330)  
(@@@@@@) : Unit price (Max. 6-digits)  
[DEPT.] : Linked department key

## TENDERING KEYS PROGRAMMING

[CASH], [CHEQUE], [CHARGE]

### Key Sequence

<P mode>

(1)--ST ALL--(A B C)--[TENDER KEY]--[#/NS]

A= +4		
+2	Amount entry is Compulsory	+2= Compulsory, +0= Optional
+1	[ST ALL] key depression is Compulsory	+1= Compulsory, +0= Optional
B= 0-9	Most significant digit of entry limit.	
C= 0-9	Number of subsequent 0's of entry limit.	

\*Preset an entry limit in the same manner as departments.

\*In case of BC = 42 ...  $4 \times 10^2 = 400$  i.e. 399 max

## FUNCTION KEYS PROGRAMMING

[MNTX/TXST], [RECD ACCT], [PAID OUT], [Amount Discount]

### Key Sequence

<P mode>

(1)--ST ALL--(A B)--[FUNCTION KEY]--[#/NS]

A= 0-9	Most significant digit of entry limit.
B= 0-9	Number of subsequent 0's of entry limit.

\*Preset an entry limit in the same manner as departments.

\*In case of BC = 42 ...  $4 \times 10^2 = 400$  i.e. 399 max

## GENERAL REFUND KEY PROGRAMMING

### Key Sequence

<P mode>

(1)--ST ALL--(A B C)--[GEN RFND]--[#/NS]

A= +4	Tax rate 3 is charged	+4= Charged, +0= Not Charged
+2	Tax rate 2 is charged	+2= Charged, +0= Not Charged
+1	Tax rate 1 is charged	+1= Charged, +0= Not Charged
B=	Most significant digit of entry limit.	
0~9		
C=	Number of subsequent 0's of entry limit.	
0~9		

\*Preset an entry limit in the same manner as departments.

\*In case of BC = 42 ...  $4 \times 10^2 = 400$  i.e. 399 max

## CHEQUE CASHING LIMIT

### Key Sequence

<P mode>

(2)--ST ALL--(A B)--[CHEQUE]--[#/NS]

A=0~9	Most significant digit of entry limit.
B=0~9	Number of subsequent 0's of entry limit.

\*Preset an entry limit in the same manner as departments.

\*In case of BC = 42 ...  $4 \times 10^2 = 400$  i.e. 399 max

## CURRENCY CONVERSION PROGRAM

Up to 4 different foreign currencies can be handled.

### STATUS

### Key Sequence

<P mode>

(N)--[RECD ACCT]--(A B)--[#/NS]--[#/NS]

N : Foreign currency number (1~4)

A : Rounding selection (0~3)

0 = Round off

1 = Round up

2 = Round down

3 = Five Rappen

B : Decimal point position (0~2)

0 = Decimal position of foreign currency : XXXXXXXX

1 = Decimal position of foreign currency : XXXXXXXX.X

2 = Decimal position of foreign currency : XXXXXX.XX

### EXCHANGE RATE

### Key Sequence

<P mode>

(N)--[RECD ACCT]--(D1 D2 D3 D4 D5 D6 D7 D8)--[% 1]--[#/NS]

N : Foreign currency number (1~4)

D1 D2 D3 D4 D5 D6 D7 D8 : Conversion Rate x 10000

## TAX PROGRAM

### No Tax Mode

### Key Sequence

<P mode>

(0)--SHIFT 1--[#/NS]

(0)--SHIFT 2--[#/NS]

(0)--SHIFT 3--[#/NS]

NOTE: In this mode, no tax line will appear on the receipt.

### Straight % Tax

Tax will be calculated by multiplying an taxable sales amount by the preset percent rate.

### Key Sequence

<P mode>

(nnnn1r00)--SHIFT 1--(aaaaaa)--[% 1]--[#/NS]

(nnnn1r00)--SHIFT 2--(aaaaaa)--[% 1]--[#/NS]

(nnnn1r00)--SHIFT 3--(aaaaaa)--[% 1]--[#/NS]

nnnn = A maximum 4-digit tax exemption limit. If a purchased taxable amount is less than this limit, tax will not be charged.

r = Rounding selection (0~2)

0: Rounding up to the next penny if the fraction is five or more.

Round down if the fraction is four or less.

1: Round up to the next penny.

2: Round down, dropping the fraction.

aaaaaa = Tax Rate x 10000

### Tax Table Look-Up with Percent Add-On

(Mixed Tax Table)

In the following tax schedule you can find that a tax amount for the sales over \$2.17 can be calculated by multiplying 5.3%. This kind of tax schedule may be called a Tax table look-up with % add-on. The area of which sale amount is less than \$2.17 is called as an irregular area.

#### Key Sequence

<P mode>

```

(nnnn2rxx)--SHIFT 1--(aaaaaa)--[% 1]--(bbbb)--[RECD ACCT]
      SHIFT 2
                        |
                    (bbbb)--[RECD ACCT]
                        |
                    [# /NS]

```

nnnn = A maximum 4-digit tax exemption limit.

If a purchased taxable amount is less than this limit, tax will not be charged.

r = Rounding selection (0~2)

0: Rounding up to the next penny if the fraction is five or more.

Round down if the fraction is four or less.

1: Always round up to the next penny.

2: Always round down, dropping the fraction.

xx = Boundary value ; The first tax amount of the regular area.

aaaaaa = Percent rate x 10000

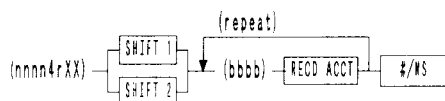
bbbb = Break point ; The lowest sales amount for each tax up to the first lowest amount of the regular area.

### Tax Table Look-Up

In the following sample, no tax is charged on amounts less than \$0.11 and after in tax is imposed at a rate of \$0.01 per tax break point. Looking down the cents of sales amount, you will see the pattern of repetition. The first repetition begins at \$1.07 where tax is \$0.09 and ends at \$1.94 where tax is \$0.16. The first amount, \$0.09 is called a boundary value. The area before the first pattern of repetition is called as a irregular area.

#### Key Sequence

<P mode>



nnnn = A maximum 4-digit tax exemption limit. If a purchased taxable amount is less than this limit, tax will not be charged.

r = Rounding selection (0~2)

0: Rounding up to the next penny if the fraction is five or more.

Round down if the fraction is four or less.

1: Always round up to the next penny.

2: Always round down, dropping the fraction.

xx = Boundary value ; The first tax amount of the regular area.

bbbb = Break point ; The lowest sales amount for each tax up to the first lowest amount of the regular area.

### VAT (Value Added Tax)

This is the tax mode used in Europe. The price of the item is called gross price, and is composed of the merchandise price and the tax. In this case, tax calculation will be performed by the multiplication between the taxable amount and the programmed percent rate. The percent to be programmed should be calculated from the percentage to net price in advance.

#### Key Sequence

```

<P mode> (nnnn8r00)--SHIFT 1--(aaaaaa)--[% 1]--[# /NS]
          (nnnn8r00)--SHIFT 2--(aaaaaa)--[% 1]--[# /NS]
          (nnnn8r00)--SHIFT 3--(aaaaaa)--[% 1]--[# /NS]

```

nnnn = A maximum 4-digit tax exemption limit. If a purchased taxable amount is less than this limit, tax will not be charged.

r = Rounding selection (0~2)

0: Rounding up to the next penny if the fraction is five or more.

Round down if the fraction is four or less.

1: Always round up to the next penny.

2: Always round down, dropping the fraction.

aaaaaa = Percent rate x 10000

Example : Tax rate 5.5% to Net Price.

\$100.00 ..... Net Price.

\$5.50 (5.5%) ..... Tax imposed.

In VAT mode, \$105.00 is entered as a amount of a merchandise.

8000---SHIFT---55000---%1---#/NS

NOTE : 0 ~ 99.9999 % can be entered as a percent rate.

## 10. CONFIRMATION OF PROGRAM

(X mode only)

### Department program

#### Key Sequence

<X mode> (1)--ST ALL--[DEPT. key]--[# /NS]

### All PLU program

#### Key Sequence

<X mode> (1)--ST ALL--[PLU]

### Individual PLU program

#### Key Sequence

<X mode> (1)--ST ALL--(PLU code)--[PLU]--[# /NS]

### Transaction key program

#### Key Sequence

<X mode> (1)--ST ALL--[CASH]

### Tax Program

#### Key Sequence

<X mode> [SHIFT 1], [SHIFT 2], [SHIFT 3]--[# /NS]

### % Rate Program

Both the percent rate(%1, %2) will be printed out.

#### Key Sequence

<X mode> [% 1]

### System Program

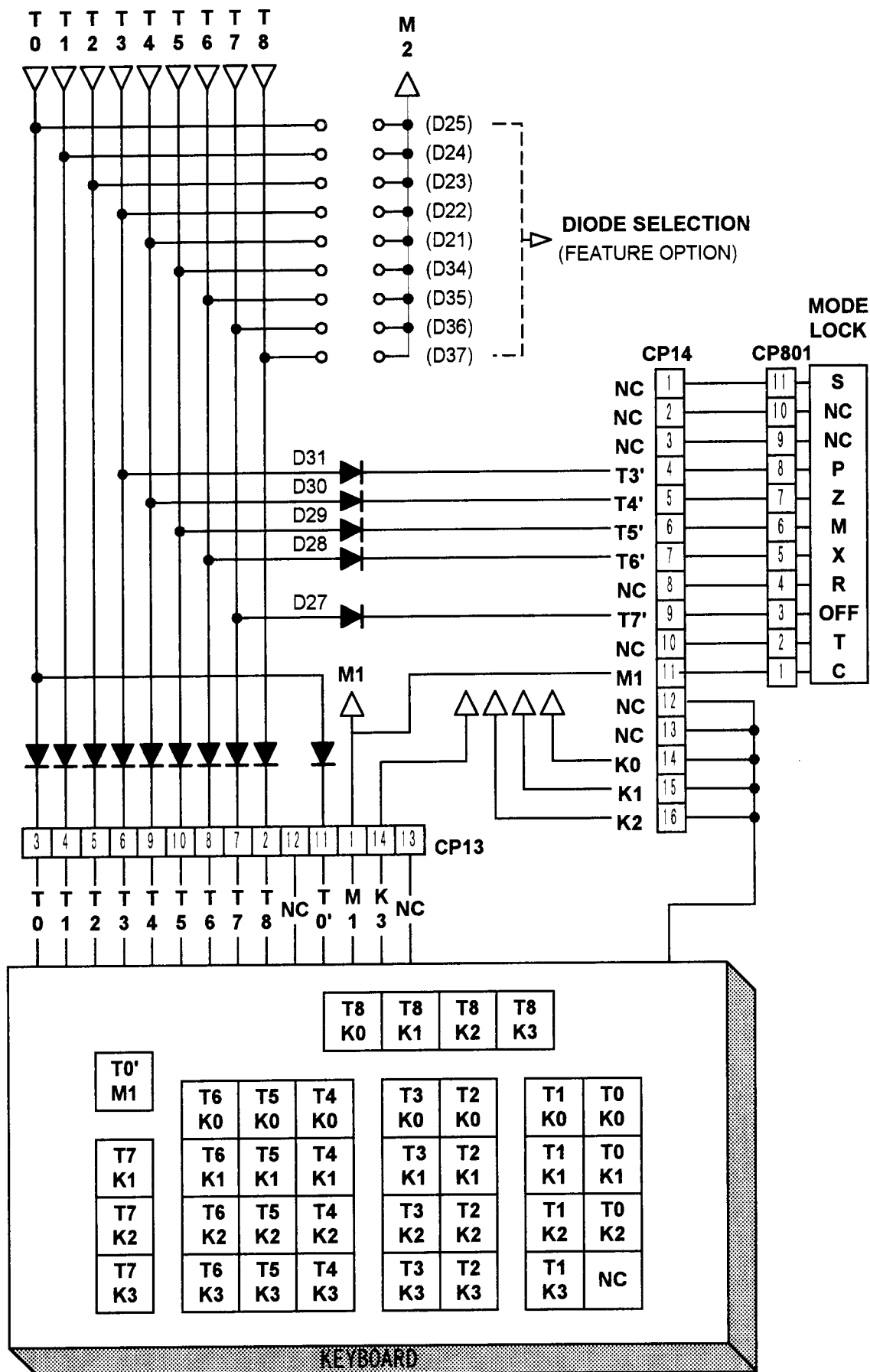
#### Key Sequence

<X mode> (2)--ST ALL

PRINT LINE ELIMINATION .....	0 1 0 0 0 0
SYSTEM PROGRAMMING .....	0 0 0 3 0 0 4
MACHINE SIZE SETTING .....	0 0 8 2
RECEIPT NUMBER SETTING .....	0 0 0 0
MACHINE NUMBER SETTING .....	. . 0 0

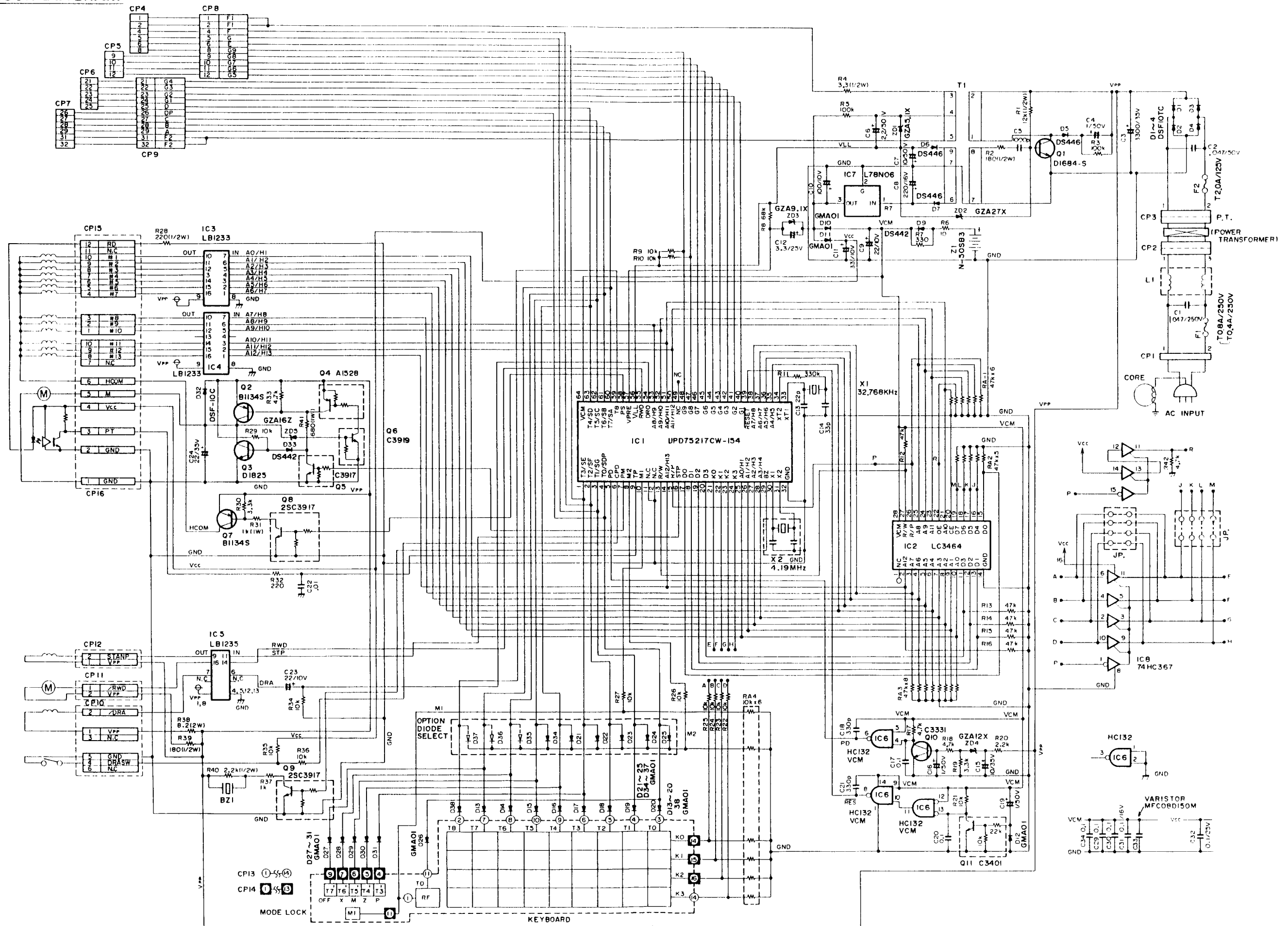
NOTE : Report ID code will not print by program confirmation.

# 11. SCHEMATIC DIAGRAM

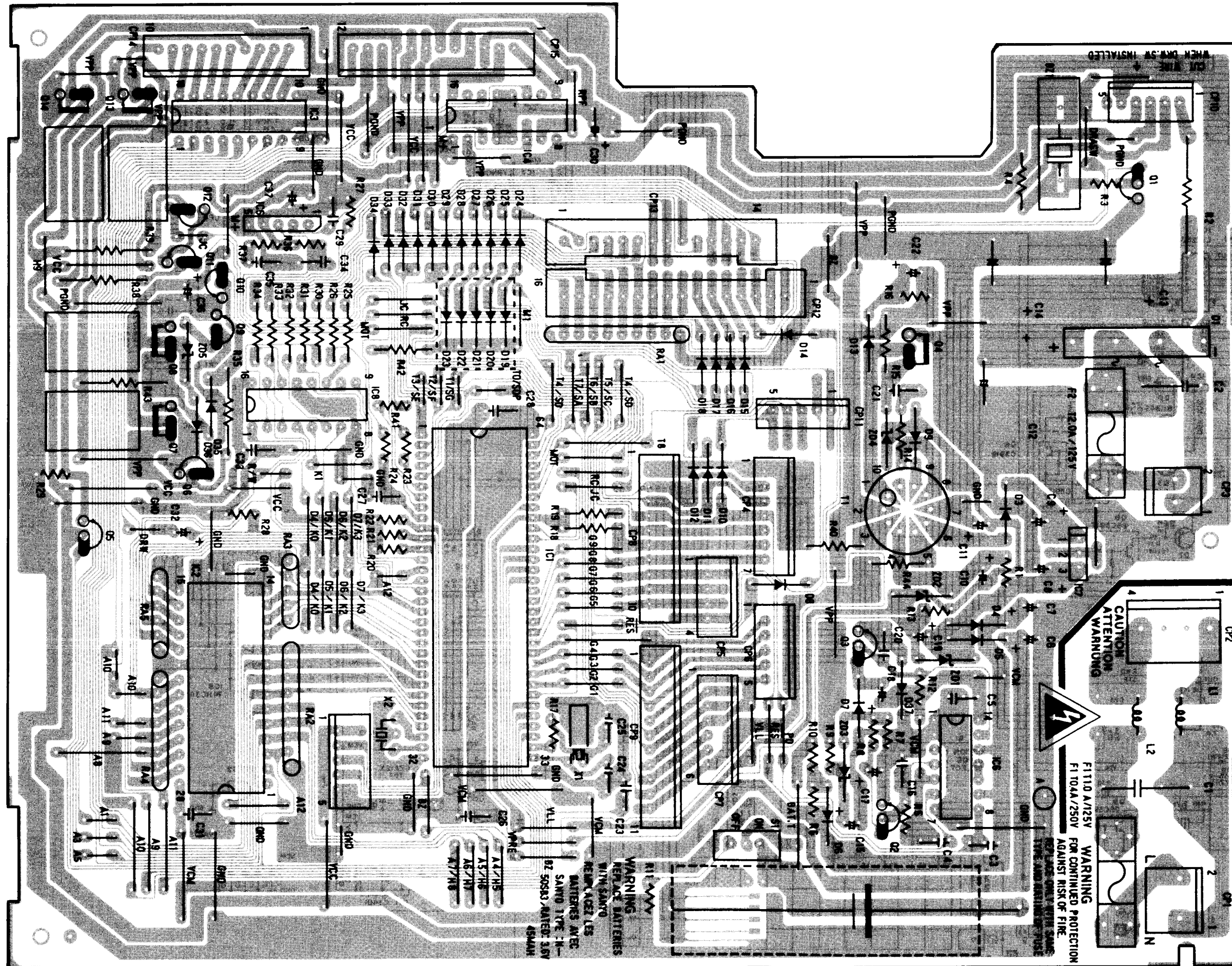




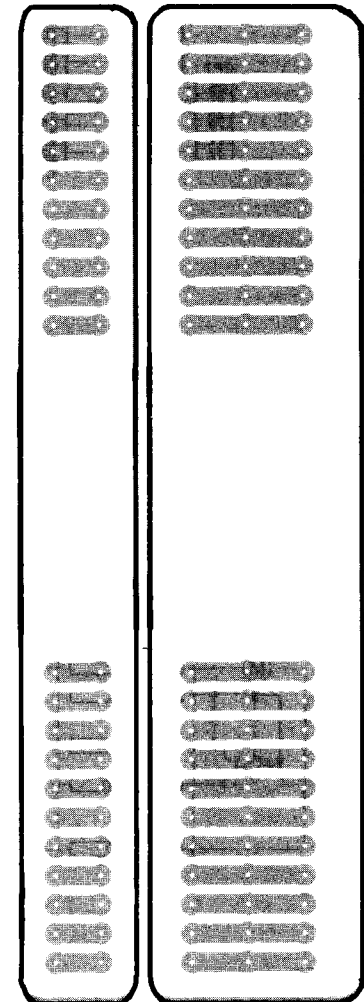
CIRCUIT DIAGRAM



**M1 PCB**



**M2 PCB**



## 13. DEVICE SPECIFICATION

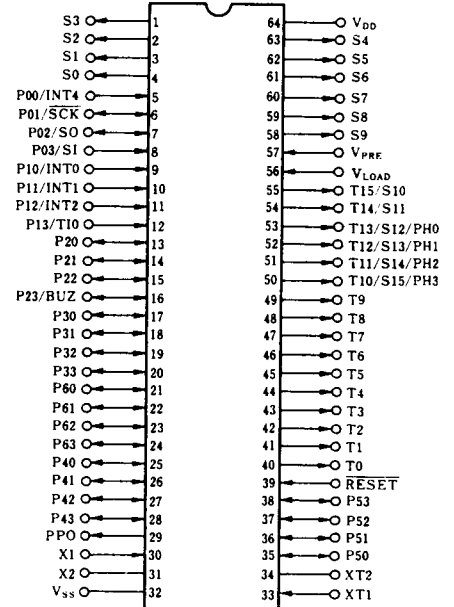
### IC1 (uPD75217CW)

The uPD75217CW is a general purpose single chip 4-bit microcomputer fabricated with CMOS technology. It contains 195,584 bit ROM, 3072 bit RAM, 55 I/O ports, real time clock and display driver. The uPD75217CW is packaged in a type of 64 pin shrink plastic DIP package.

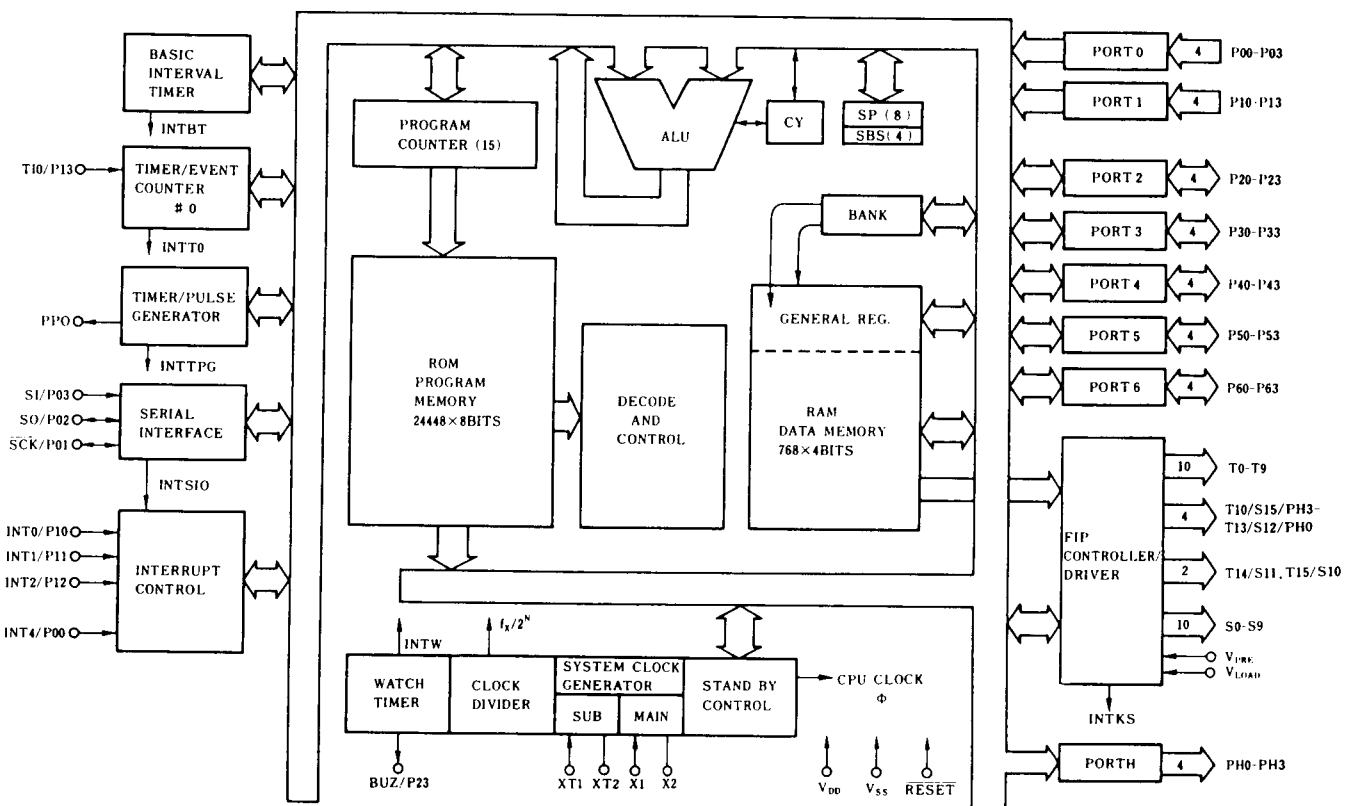
DC CHARACTERISTICS (Ta = -40 ~ +85°C, VDD = 2.7 ~ 6.0 V)

Parameter	Symbol	Condition	Min.	Typ.	Max	Unit
Input Voltage (High)	VIH	Except Port	0.7 VDD		VDD	V
Input Voltage (Low)	VIL	0, 1, 6, RES, X1, X2, XT1	0		0.3 VDD	V
Output Voltage (High)	VOH	VDD = 5V, IOH = -100 $\mu$ A	VDD - 0.5			V
Output Voltage (Low)	VOL	VDD = 5V, IOL = 400 $\mu$ A			0.5	V
Input Leak Current H	ILIH	Except X1, X2, XT1			3	$\mu$ A
Input Leak Current L	ILIL	Except X1, X2, XT1			-3	$\mu$ A
Output Leak Current H	ILOH				3	$\mu$ A
Output Leak Current L	ILOL	Except Display out, Display output			-3	$\mu$ A
Output Display Current	IOD	S0 ~ S9	-3	-5.5		mA
		T0 ~ T15	-15	-22		mA
Supply Current	IDD1	VDD = 5V, 4.19 MHz		3.0	9.0	mA
	IDD3	VDD = 3V, HALT MODE		5	15	$\mu$ A

### PIN ARRANGEMENT



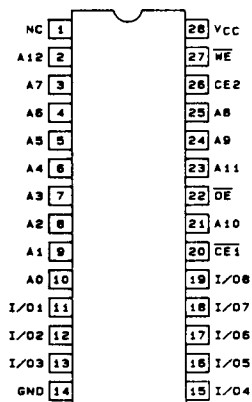
### BLOCK DIAGRAM



## SIGNAL DESCRIPTION

No	Name	Signal	I/O	Description	No	Name	Signal	I/O	Description
1	S3	T3/Se	O	Key scan signal / Segment signal for display	36	P51	A5/H6	O	Address bus for RAM / Printer digit select signal
2	S2	T2/Sf	O		37	P52	A6/H7	O	
3	S1	T1/Sg	O		38	P53	A7/H8	O	
4	S0	T0/SDP	O		39	RESET	RESET	I	Reset Signal
5	P00/INT4	PD	I	Power down signal	40	T0	G1	O	Display digit signal
6	P01/SCK	CPD	I	Drawer open sensor signal	41	T1	G2	O	
7	P02/S0	PM	O	Motor signal for printer	42	T2	G3	O	
8	P03/S1	M2	I	Key return signal (option diode)	43	T3	G4	O	
9	P10/INT0	TP	I	Timing pulse from printer	44	T4	G5	O	
10	P11/INT1	M1	I	Key return signal (Mode lock, PF key)	45	T5	G6	O	
11	P12/INT2	(NC)	-		46	T6	G7	O	
12	P13/T10	(NC)	-		47	T7	G8	O	
13	P20	R/W	O	Read / Write signal for RAM	48	T8	G9	O	Address bus for RAM / Printer digit select signal
14	P21	A12/H13	O	Address bus for RAM / Printer digit select signal	49	T9	(NC)	-	
15	P22	R/P	O	RAM/Printer selection signal	50	T10/S15/PH3	A11/H12	O	
16	P23/BUZ	STP	O	Logo Stamp drive signal	51	T11/S14/PH2	A10/H11	O	
17	P30	D0	I/O	Data bus	52	T12/S13/PH1	A9/H10	O	Drawer drive signal
18	P31	D1	I/O	Data bus	53	T13/S12/PH0	A8/H9	O	
19	P32	D2	I/O	Data bus	54	T14/S11	DR0	O	
20	P33	D3	I/O	Data bus	55	T15/S10	RWD	O	
21	P60	K0	I	Key return signal	56	VLOAD	VLL	-	Typ. -25 V for display
22	P61	K1	I	Key return signal	57	VPRE	VPRE	-	Typ. -3.5 V for display
23	P62	K2	I	Key return signal	58	S9	PS	O	Print control command signal
24	P63	K3	I	Key return signal	59	S8	T8	O	Key scan signal
25	P40	A0/H1	O	Address bus for RAM / Printer digit signal	60	S7	T7/Sa	O	Key scan signal/Segment signal for display
26	P41	A1/H2	O		61	S6	T6/Sb	O	
27	P42	A2/H3	O		62	S5	T5/Sc	O	
28	P43	A3/H4	O		63	S4	T4/Sd	O	
29	PP0	BZ	O	Buzzer signal	64	VDD	VCM	-	Power supply +5 V
30	X1	X1	-	Main clock oscillation (4.19 MHz)					
31	X2	X2	-						
32	VSS	A4/H5	-	0V signal ground					
33	XT1	A5/H6	-	Time clock oscillation(32.768 kHz)					
34	XT2	A6/H7	-						
35	P50	A7/H8	O	Address bus for RAM / Print digit select signal					

## IC2 (LC3564PL)



A0 ~ A12 : Address input  
 / WE : Read / Write enable input  
 / OE : Output enable input  
 / CE1, CE2 : chip enable input  
 I / O1 ~ I / O8 : Data input / Output  
 Vcc, GND : Power Supply, Ground

## OPERATING MODE

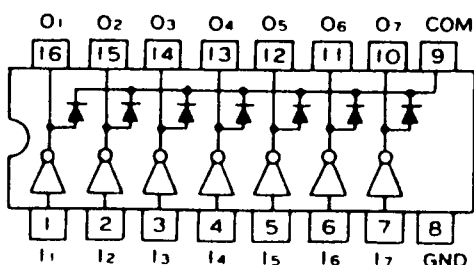
Operation Mode	/ CE1	CE2	/ OE	/ WE	I / O
Read	L	H	L	H	Data Out
Write	L	H	X	L	Data In
Output Deselect	L	H	H	H	High-Z
Standby	H	X	X	X	High-Z
	X	L	X	X	High-Z

X : H or L

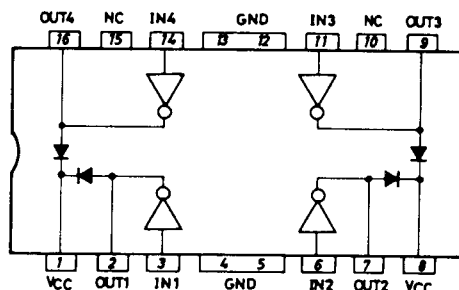


**IC3,4 (LB1233)**

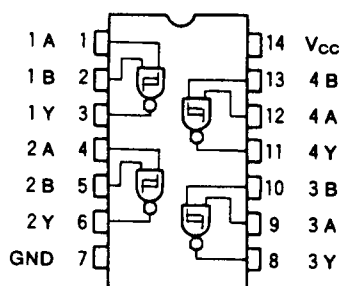
MOMOLYTHIC IC 7-DARLINTON DRIVER ARRAY  
 CHARACTERISTICS (Ta=25°C)  
 VOUT 50V  
 VIH 3 ~30V  
 VIL -0.3 ~ +0.3V  
 IOU MAXIMUM 500mA

**IC5 (LB1235)**

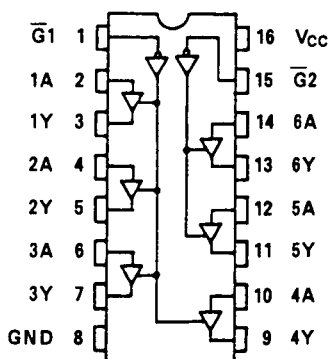
MOMOLYTHIC IC 4-DARLINTON DRIVER ARRAY  
 CHARACTERISTICS (Ta=25°C)  
 VOUT 65V  
 VIH 2 ~15V  
 VIL -0.3 ~ +0.3V  
 IOU MAXIMUM 1.5A

**IC6 (TC74HC132AP)**

QUAD 2-INPUT SCHMIT NAND GATE

**IC8 (TC74HC367AP)**

NON-INVERTED HEX BUS BUFFER

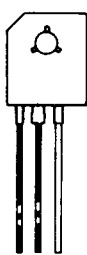


INPUT		OUTPUTS
G	An	Y (367A)
L	L	L
L	H	H
H	X	Z

X : DON'T CARE  
 Z : HIGH IMPEDANCE

**IC7 (L78N06)**

Voltage regulator



1. Vin
2. Gnd
3. Out put

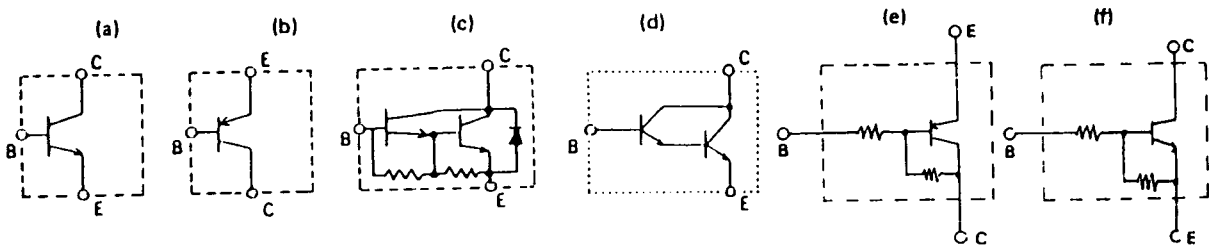
(Tj = 25°C, VIN = 11V, IOU = 350 mA)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit.
Input V.(Recommend)	VIN	Tj = 25°C	8.5		21	V
Output Current	IOU		5		500	mA
Output Voltage	VOUT	Tj = 25°C	5.75	6.0	6.25	V
Line Regulation		9V ≤ VIN ≤ 20V, IOU=200mA		1.5	30	mV
Load Regulation		5mA ≤ IOU ≤ 200mA			60	mV
Supply Current	ICC	Tj = 25°C		4.5	6.0	mV

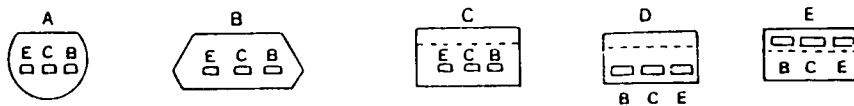
## TRANSISTORS

TRANSISTOR		BIAS R.		ABSOLUTE MAXIMUM RATING					hFE			fT (MHz)	CIR- CUIT	PACK- AGE
TYPE No.	USE FOR	R1 ( $\Omega$ )	R2 ( $\Omega$ )	V <sub>CB0</sub> (V)	V <sub>CEO</sub> (V)	V <sub>EB0</sub> (V)	I <sub>C</sub> (mA)	PC (mW)	hFE	V <sub>CE</sub> (V)	I <sub>C</sub> (mA)			
2SA1528	Switching	---	---	-50	-50	-6	-500	600	50<	-5	-10	250	e	A
2SB1134-S	Switching	---	---	-60	-50	-5	-5A	25W	140-280	-2	-1A	30	b	D
2SC3331-T	LF amplifier	---	---	60	50	6	200	500	200-400	6	1	200	a	A
2SC3401	Switching	46K	23K	50	50	10	100	300	50<	5	5	250	a	B
2SC3917	Switching	4.7K	4.7K	50	50	6	500	300	50<	5	20	250	a	B
2SC3919	Switching	2.2K	2.2K	50	50	6	500	300	50<	5	50	250	a	B
2SD1684-S	Switching	---	---	120	100	6	1.5A	10W	140-280	5	100	120	a	D
2SD1825	Driver	6K	200	70	60	6	4A	20W	2000-5000	2	2A	20	c	D

## CIRCUIT



## DRAWING



## DIODES

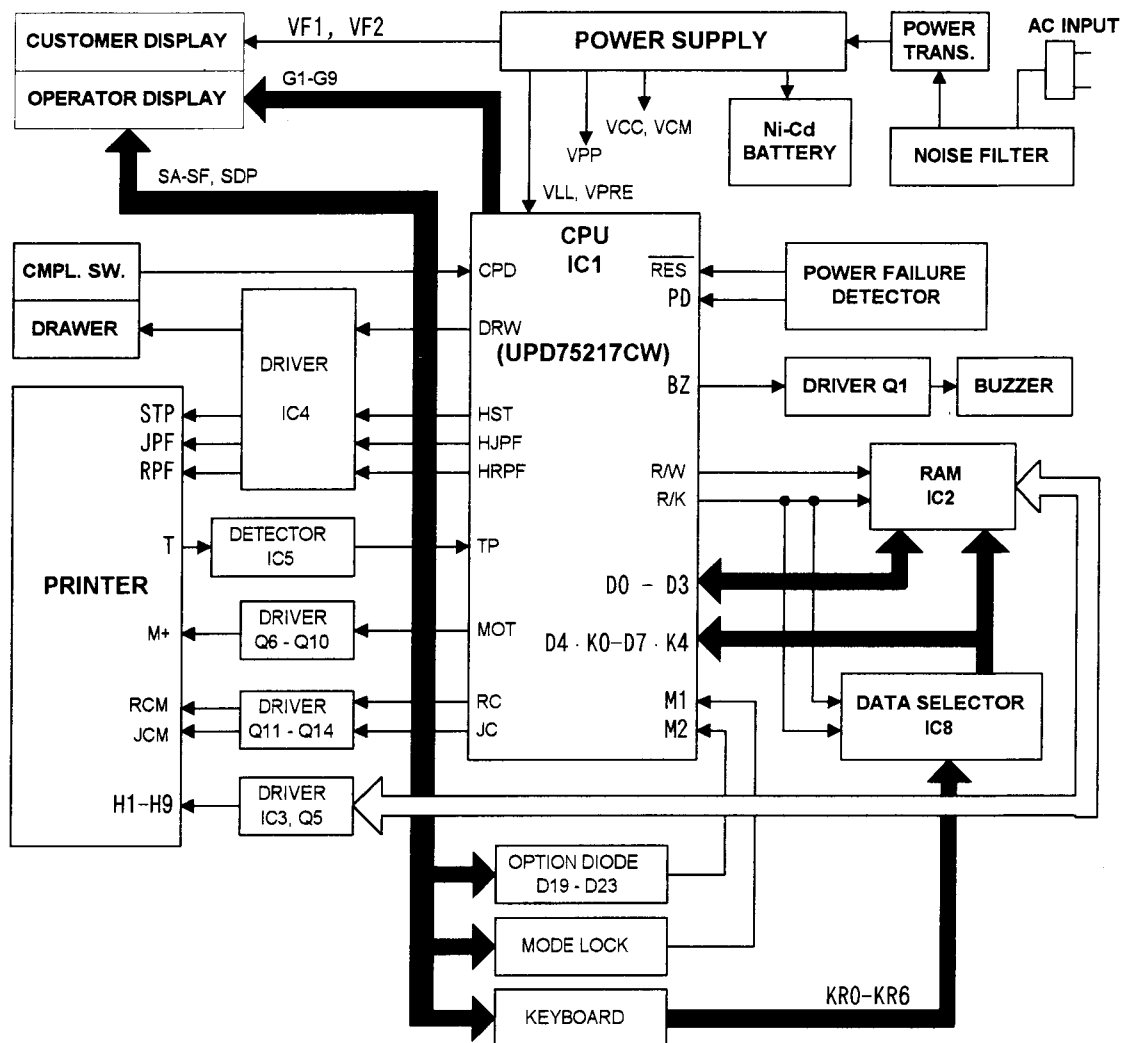
DIODE		ABSOLUTE MAXIMUM RATINGS					
TYPE NO.	USE	V <sub>RM</sub> (V)	V <sub>R</sub> (V)	I <sub>FM</sub> (A)	I <sub>O</sub> (A)	I <sub>SURGE</sub> (A)	
DS446	High speed switching	105	100	0.5	0.2	0.7	V <sub>F</sub> =0.65V (I <sub>F</sub> =1.5mA)
GMA01	High speed switching	60	55	0.36	0.12	0.5	V <sub>F</sub> =0.68V (I <sub>F</sub> =1.5mA)
DSF10TC	Rectifier	200	---	---	1	45	V <sub>F</sub> =1V (1F=1A)
DSF10TE	Rectifier	400	---	---	1	45	V <sub>F</sub> =1V (1F=1A)

## ZENER DIODES

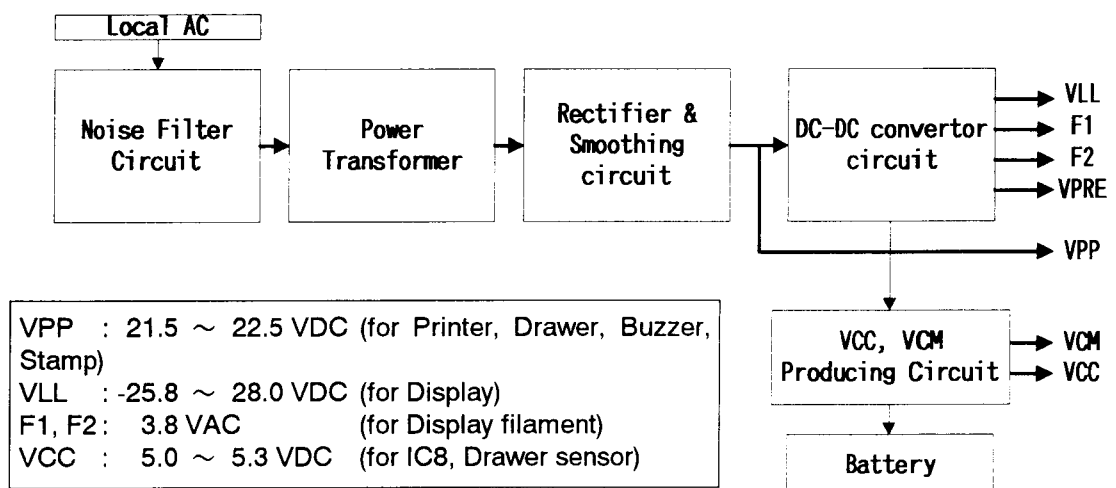
ZENER DIODE TYPE NO.	MAX. RATING		VZ			IR ( $\mu$ A)	VR (V)
	P (W)	P <sub>PEAK</sub> (W)	Min. (V)	Max. (V)	I <sub>Z</sub> (mA)		
GZA5.1X	0.5	1.25	4.80	5.10	5	-1	-1
GZA9.1X	0.5	1.25	8.60	9.05	5	-0.5	-7
GZA12X	0.5	1.25	11.40	11.95	5	-0.5	-9
GZA16Z	0.5	1.25	16.35	17.10	5	-0.5	-12
GZA27X	0.5	1.25	25.50	26.50	5	-0.5	-21

## 14. DESCRIPTION OF CIRCUIT

## ■ BLOCK DIAGRAM



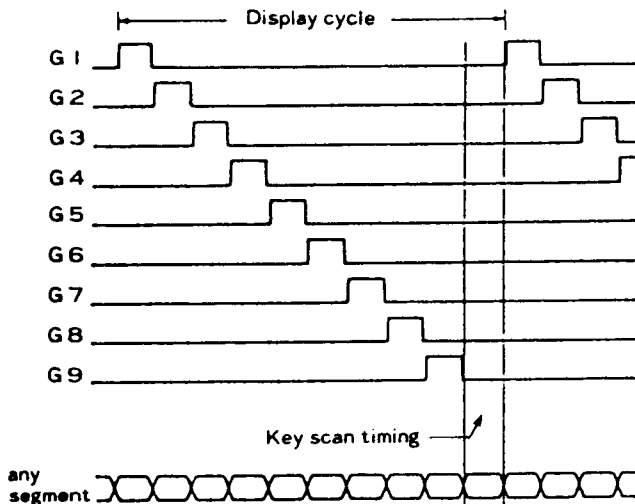
## 14-1. POWERSUPPLY SECTION



## 14-2. DISPLAY AND KEY SCANNING CIRCUIT

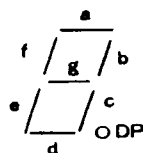
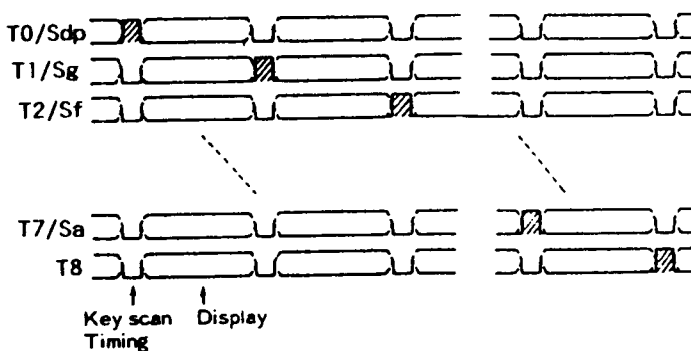
### DIGIT SIGNALS WITH KEY SCAN TIMING

The uPD75217CW has a built-in display controller which reads out contents of the display memory and automatically generates digit signal, segment signal and a high voltage output buffer which can directly drive fluorescent display tube. The output of digit signals and segment signals is as follows.



### SEGMENT SIGNALS / KEY SCAN TIMING

Key matrix is scanned by the segment drive signals of display. As shown below one segment drive signal is output in the last key-scan-timing of the display cycle to scan one line of matrix. Every keys are scanned in 9 display-cycle.

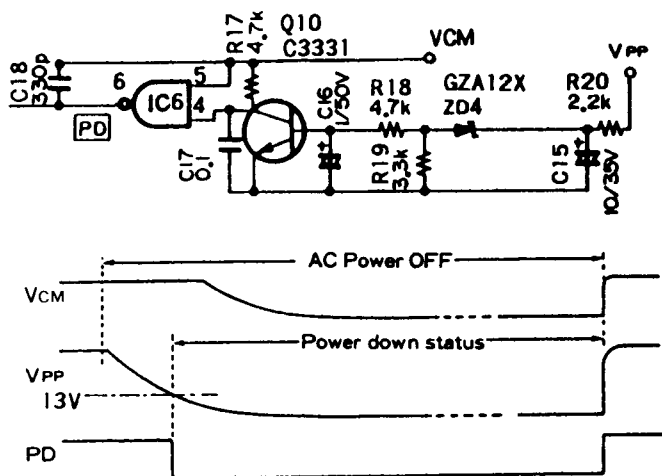


## 14-3. POWER FAILURE DETECTING CIRCUIT

This circuit detects the power failure or the power on and generates PD signal to keep memory or to prevent the circuit from erroneous operation which is the unstable transient period of power supply.

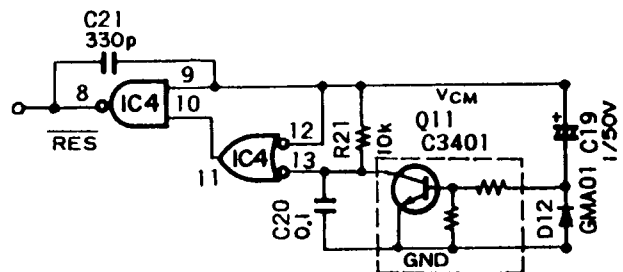
The level of VPP (22V) drop when the AC power supply is turned off when an instantaneous power failure occurs.

The circuit detects the VPP falling down less than some 13V and make the PD signal Low-level. On receiving PD signal the CPU shelters the present program counter and the contents of each register from extinction. Also the CPU stops the clock oscillation of X1 (4.19 MHz) to save the power consumption. When the AC power is turned on, PD signal is recovered High-level. CPU will active again.



## 14-4. RESET CIRCUIT

This circuit generates RES signal. That reset signal resets the CPU. This signal is generated by turning on the AC power when the VCM voltage is lower than about 2.4 volts. If the Ni-Cd battery voltage is normal, this signal will not generate even if the AC power is off. RAM access is inhibited during RES signal is low.





## NOISE FILTER CIRCUIT

Alternating input current (AC) is led to the transformer (P.T) through a Fuse (F1) and the noise filter composed of C1 and L1 on the M1 board. The filter components work not only to prevent internally generated noise from being fed back to AC line, but also to attenuate the spike voltage for prevent of effects to power supply circuit.

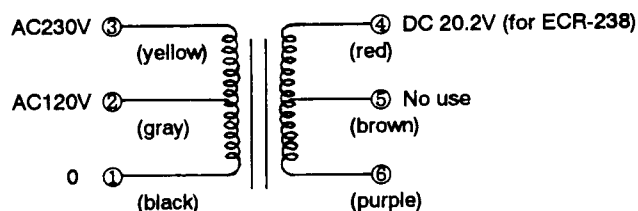
The Ring core wound by the Ground wire of AC cord also works as a noise filter.

## POWER TRANSFORMER

The power transformer transforms the local AC input to the internal AC (around 20V) voltage.

## IMPORTANT

The transformer can be used for both of the rated input voltage AC 120V and AC 230V by switching the input terminal of 2-pin and 3-pin.



### CAUTION

When replacing the power transformer, it must be replaced complete assembly unit.

## RECTIFIER AND SMOOTHING CIRCUIT

The internal AC (around 20V) voltage from the power transformer is bridge-rectified by the Diodes (D1~D4) and smoothed by the Capacitor (C3).

The voltage after rectification is about 21.5 ~ 22.5 VDC for the rated input (VPP).

## DC-DC CONVERTER CIRCUIT

Transistor Q1 is turned on by making the base voltage at least 0.7 volts higher than the emitter voltage which is coming from VPP through out a register R1.

Transistor Q1 is supplying a current to terminal 1 and 2 of inverter transformer (T1). This allows a greater current to flow between terminal 7 and 8, thus transistor Q1 will be turned on.

At the same time, the voltage occurred between terminal 9 and 6 of inverter transformer (T1). When this voltage exceeded the regulation value of zener diode ZD1, the current will be flow into the zener diode.

(Zener diode prevent reflection of incoming voltage waves from external connections)

As a result, transistor Q1 will be turned off.

Above ON-OFF cycle happens repeatedly.

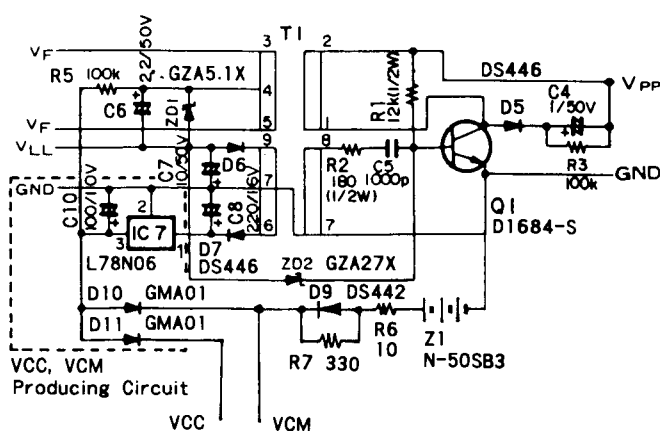
### VCC, VCM PRODUCING CIRCUIT

At the AC plugged in, a voltage is generated between the 6 pin and 7 pin of the inverter transformer (T1). Half-wave rectifying is done at the diode D7 and then this positive voltage (9V) will be supplied to the 1 pin of IC7. The regulated output voltage (6V DC) is generated from the 3 pin of the voltage regulator IC7. This output voltage is supplied to VCM line through the diode D10. Also it supplied to VCC line through the diode D11.

Mainly the Ni-Cd battery is used to back up the memory. It takes approximately 48 hours to full charge it through the charge circuit D9, R7 and R6 supplied by the VCM.

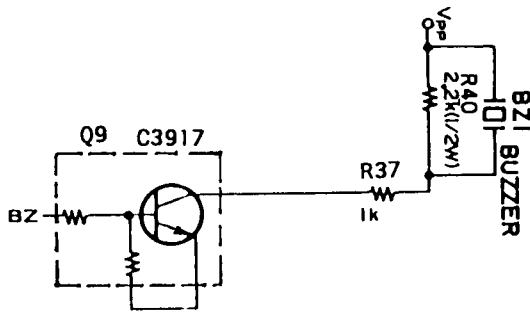
At the time of AC power off, the battery begins to supply the dis-charge voltage to the VCM line through R6, R7 and D9.

The discharge current is under 10  $\mu$ A, and the full charged battery will be able to back up the memory minimum 1,000 hours.

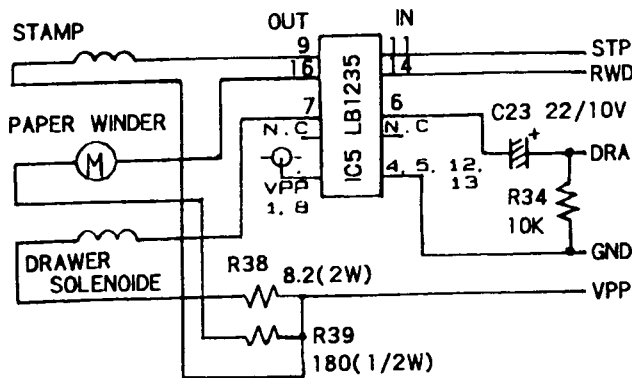


#### 14-5. BUZZER CIRCUIT

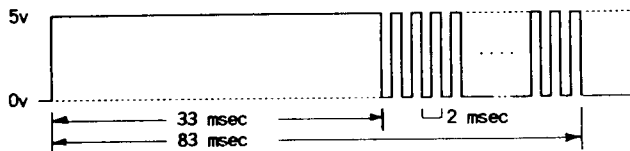
CPU generates a buzzer drive signal, of which frequency is 1700 Hz and output it.



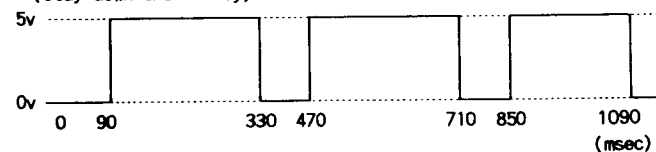
#### 14-6. DRAWER / PAPER WINDER STAMP CIRCUIT



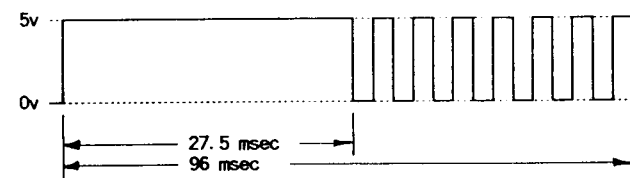
© STP signal from IC1-16pin



© RWD signal from IC1-55pin  
(Stay down the PF key)



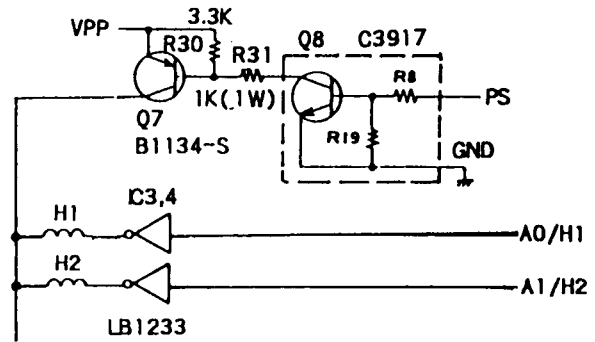
© DR0 signal from IC1-54pin



#### 14-7. PRINTER CIRCUIT

##### CHARACTER SELECTIVE CIRCUIT

When the print command signal PS is supplied from 58 pin of IC1, the Q7 is enable to turn on. At the same time, the character selective signal H1 ~ H13 are supplied and each character selective magnet will set the character to its print position.

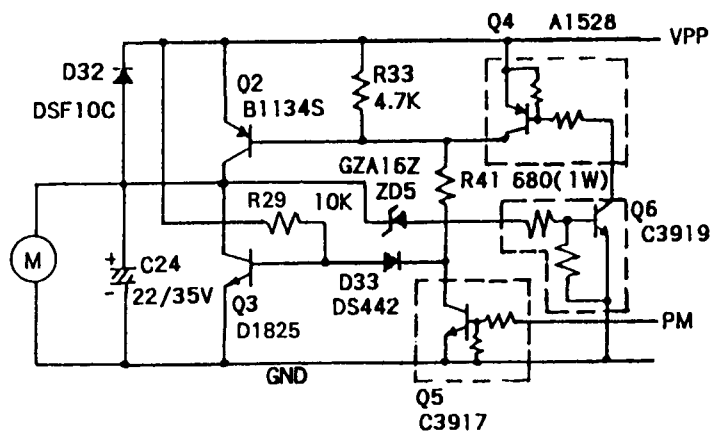


##### MOTOR DRIVE CIRCUIT

- ① The printer motor control signal PM is supplied from the 7 pin of IC1 as active High-level. The transistor Q5 is turned on by the PM signal, then the base voltage of Q5 goes low through the diode D33 and Q5 turned OFF.
- ② When Q5 is off, the motor drive transistor Q2 is turned ON, and the motor starts rotating.
- ③ If the motor voltage is going to over the rated value, the over current is supplied to the base of Q6 through the zener diode ZD5.
- ④ When Q6 is ON, the Q4 is going to OFF, then Q2 is turned to OFF. When the Q2 is OFF, the motor voltage is getting decreased to the specified value, which is mainly fixed by the zener voltage of ZD5.

When the motor voltage is getting under the specified value, the transistor Q2 is turned ON again and repeated the cycle ②~④. This feedback loop makes to regulate the motor voltage for the security. The capacitor C24 is installed as to avoid the deviation of this feed-back loop. The diode D32 is an spike voltage killer.

- ⑤ When the printer motor control signal PM is turned OFF from the IC1, the Q5 becomes OFF and Q2 is turned OFF.
- ⑥ When Q2 is OFF, the base voltage of Q3 is getting High by R29 and Q3 is turned ON. When Q3 is ON, this transistor lose the electricity generated in the motor itself to the ground rapidly. And the motor stop rotating.



## 15. TROUBLE SHOOTING

In a case of trouble shooting, please try the Self-Diagnostics operation first. If you find the specific symptom, go to the section (2). If the Self-Diagnostics does not work, check as following first.

### PREPARATION OF TROUBLE SHOOTING

Before opening the cabinet to trying the machine repairs, it recommended that you will take the self diagnosis operations.

### VISUAL INSPECTION

If visual inspection does not reveal an apparent problems, use an multimeter to check that there are no short-circuit on the board or components.

- (1) Are there any loose connection cables ?
- (2) Are there any discolored parts?
- (3) After the AC power is turned on, are there any parts that will be get abnormally hot, making too much noise or gives off the smoke?
- (4) Are there any loose soldering on the board?

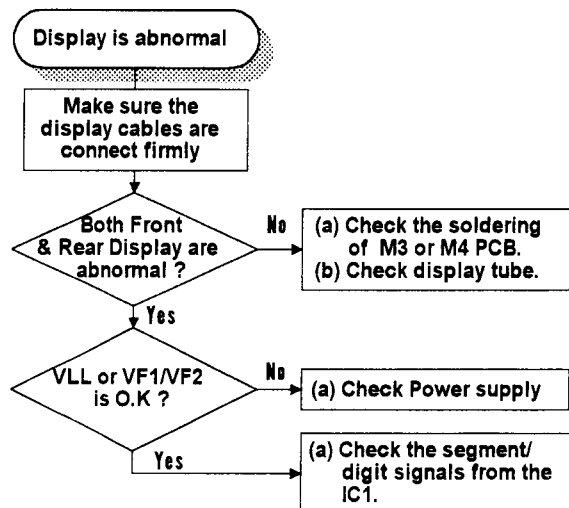
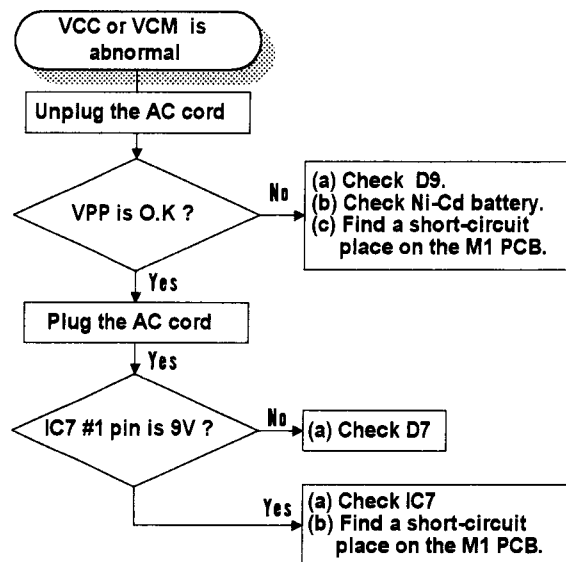
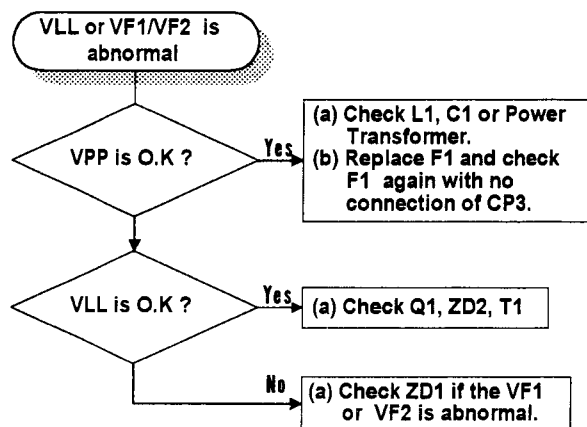
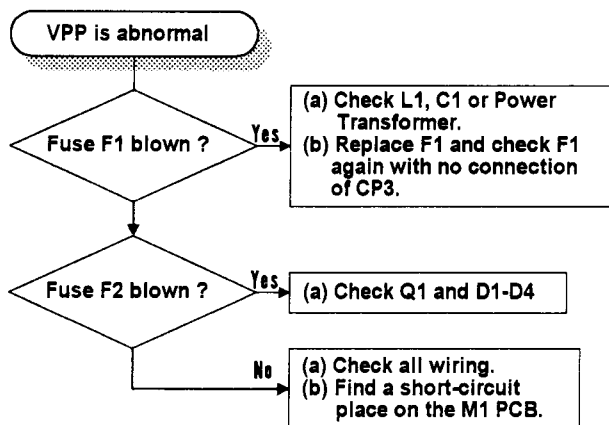
### COMMON VOLTAGE INSPECTION

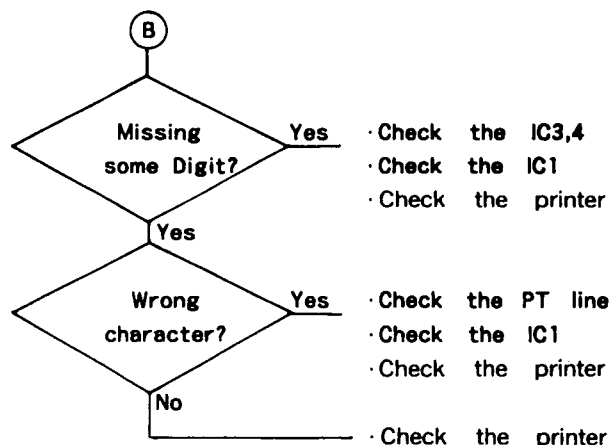
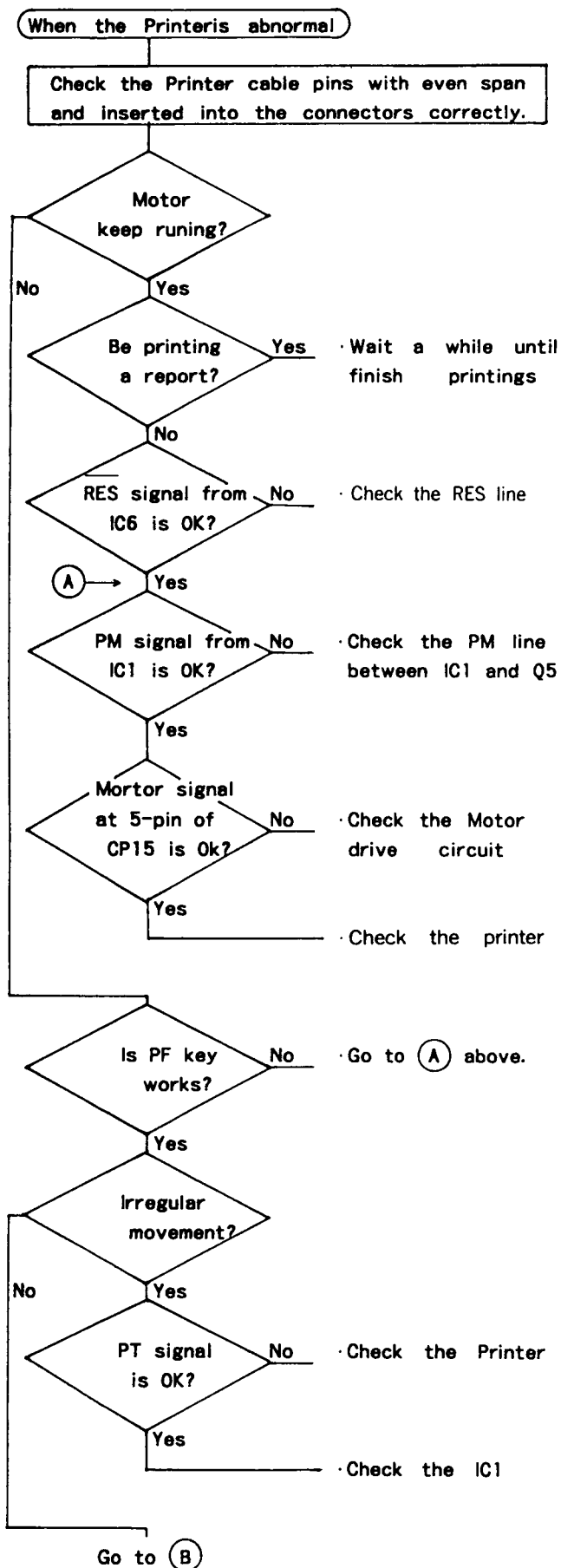
With a multimeter, check the following voltage are correct. If the some of voltage is out of the specified voltage range, it should be adjusted by the variable resistor.

### VOLTAGE SPECIFICATION

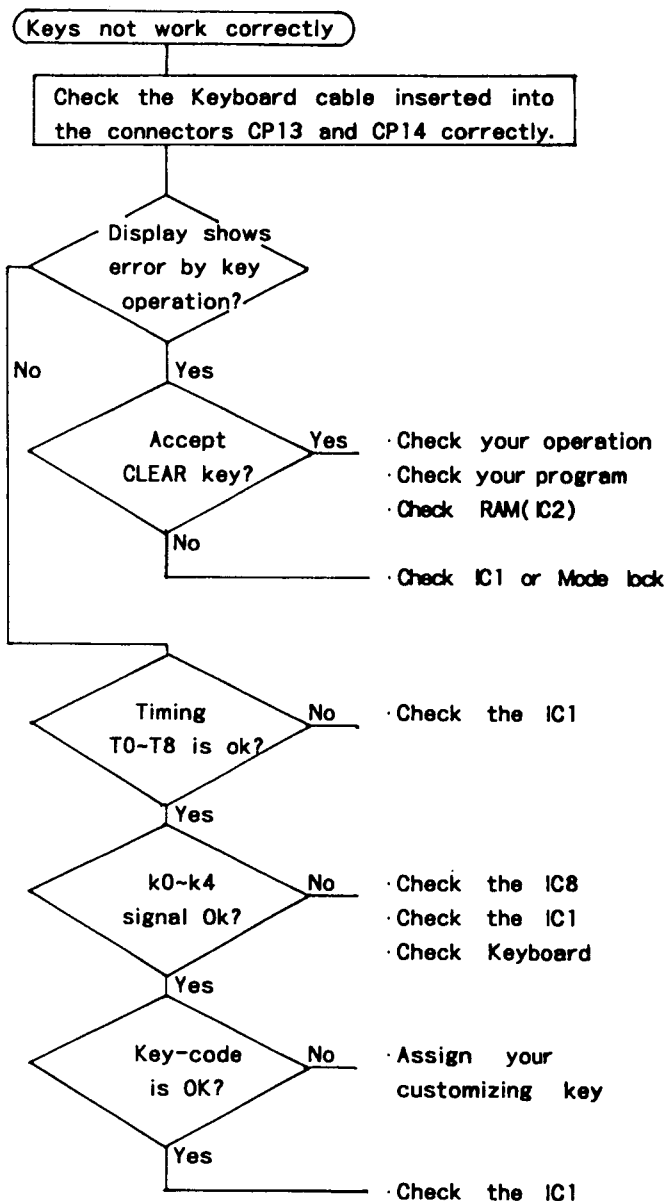
- (1) VPP ; DC +21.5V ~ +22.5V
- (2) VCC ; DC + 5.0V ~ + 5.3V
- (3) VLL ; DC -25.8V ~ +28.0V
- (4) VF1, VF2; AC 3.8V
- (5) VCM ; DC + 4.9V ~ + 5.3V (at AC ON)  
(at AC OFF = 3.0~4.2VDC)

Note: The minimum voltage of VCM is should be over than +2.5V to be hold the contents of memory while the AC power is off.





**(4) Check points for the Keyboard.**



## 16. DESCRIPTION OF PRINTER

### 1.1 OVERVIEW

#### 1.1.1 SPECIFICATIONS

The Model-405R Digital Printer is developed and designed for use with ECR.

1. Print method                      Print wheel selection
2. Carriage width                  13 columns
3. Character positions            12 characters
4. Print speed                      typ. 3.2 lines/sec. (lps)
5. Character selection            Trigger magnet
6. Character size                  1.6mm(W) × 2.8mm(H)
7. Paper free future              The paper can be pulled straight out towards you.
8. Paper
  - Type :                      Roll paper (plain paper)
  - Width :                    57.5 ± 0.5 mm
  - Roll :                      diameter 80 mm or less
  - Thickness :                0.06~0.085 mm
  - Weight :                   47 to 64 g/m<sup>2</sup>  
(equivalent to 40-55 kg / 1000 sheets/1091 × 788 mm)
9. Ribbon
  - Type :                      Purple, nylon ribbon
  - Service part code : 632 250 3397
10. Motor
  - Suspension of the motor in standby status as well as activating and stopping the motor are performed by controlling the ON/OFF status of the motor's power supply.
  - Terminal Voltage: 17V ± 7%
  - Typical current : 0.15A or less (17V, 25°C)
11. Character selective magnets (unit)
  - Quantity :                  12 selective magnets
  - Terminal Voltage : 17 VDC (+2.5V/-1.5V) (the motor and character selective magnet coils shall use the same power source)
  - DC resistance : 250 ± 25 Ω (at 25°C)
  - Charge : From the front edge of Timing signal Tn to front edge of Tn + 1
12. Timing detector
  - The timing detector consists of a LED and a photo IC. It generates Timing signals (T0 to T12) corresponding to each of the 12

characters on the printwheel as well as the Timing signal Ts which determines the position where the power supply to the motor is cut off.

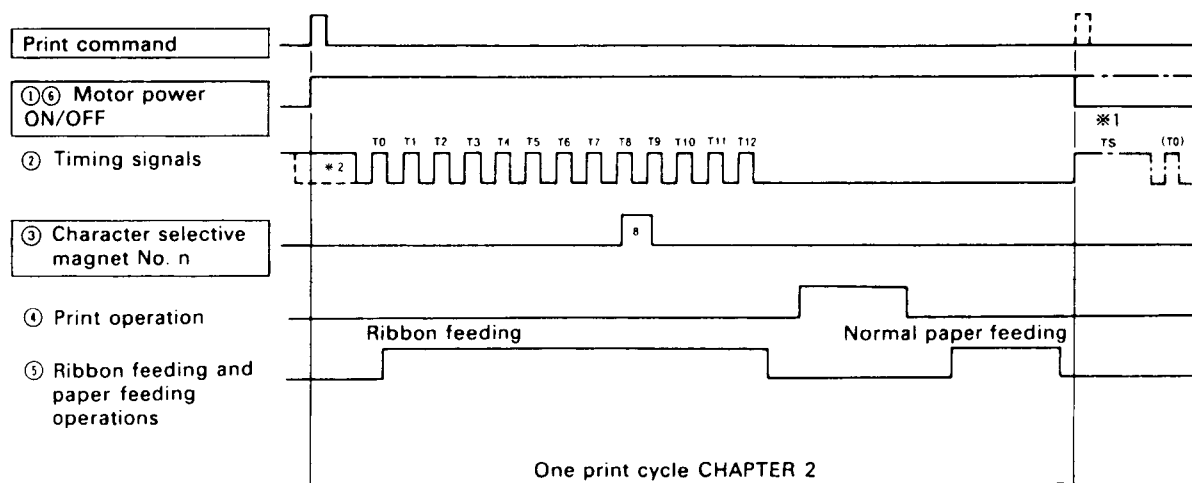
- Voltage :                      5 to 15 V
- Typical current :              30 mA (typ.)  
(when the total circuit current is 5 V at 25°C)
- 13. Guaranteed operating temperature : 0°C to 50°C
- 14. Reliability                      MCBF 1,000,000 lines
- 15. External dimensions  
100.8(W) × 125.3(D) × 54(H) mm
- 16. Weight Approx.              500 gm

#### 1.1.2 PRINTER OPERATION

The printer operation during one print cycle is as follows. (refer to belows figure)

- ① Upon receipt of a Print command, the motor is supplied with power and begins rotating.
- ② The motor's rotation also causes the printing wheels to rotate, and the timing detector generates Timing signals which correspond to the characters on the printing wheels.
- ③ The Timing signals are counted. When columns (print wheels) that will be printed with a character are detected, charging the character selective magnets for the pertinent columns will mechanically set the characters to their print positions. For any column that does not require printing, not charging its character selective magnet will cause a "blank" section of the printing wheel to be set at the print position.
- ④ When character selection for all printing wheel is completed, the platen over the printing wheel to print one line.
- ⑤ Before printing, the ribbon is automatically fed by the cam gear. After printing, the page is automatically fed by the paper feeding gear train.
- ⑥ The printing wheel are returned to standby position by the selective gear, selective transmission gear, and intermittent gear. During the return phase of the printing wheel, the timing detector generates Timing signal TS to cut off the power supply to the motor, thereby completing one print cycle.

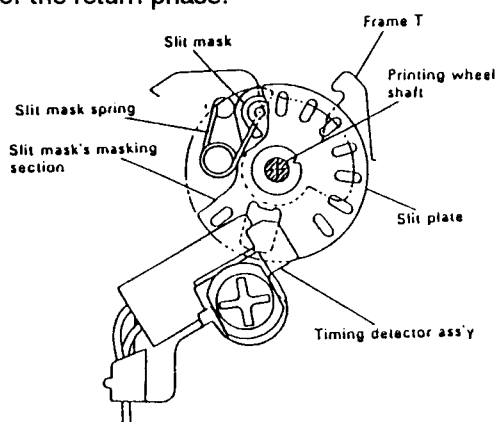
(Mechanical Timing Chart)



### 1.1.3 DETECTION MECHANISM

As shown in Figure, the detection mechanism consists of the slit plate, slit mask, and slit mask spring (which are part of the printing wheel ass'y) as well as the timing detector ass'y. It generates Timing signals that correspond to type positions on the printing wheel, Timing signals for detecting the end of each print cycle, and Timing signals for detecting the cutoff position for the power supply to the motor.

The slit plate is provided with two types of slits ; (1) 12 slits that correspond to the type positions (T0 to T12), (2) one wider slit that is unrelated to the type positions (TS). To eliminate unnecessary Timing signals, the slit mask rotates freely on the printing wheel shaft so that the masking section of the slit mask is controlled by the slit mask spring as follows ; During the standby and character selection phases, the slit mask permits passage of the light emitted by the LED to the photo IC. During the printing and return phases, it obstructs the light emitted by the LED. When slit TS which corresponds to Timing signal TS is positioned along the optical path between the LED and the photo IC, the slit mask again permits the light to pass. Consequently, only two types of Timing signals are generated. The 13 Timing signals T0 to T12 are generated during the character selection phase, and the Timing signal TS is generated at the end of the return phase.



#### Daily Check

Check to see if the printer is always being maintained in optimum conditions. If any dissatisfactory points are discovered, they shall be remedied.

#### Periodic Check

Every six months, periodic maintenance and inspection of the following points should be conducted ;

Check Item	Standard	Repair Method
Adhesion/penetration of dirt, paper scraps or dust to the printer parts	No excessive adhesion of dirt, paper scraps or dust on the moving parts.	Use a vacuum cleaner to carefully remove all foreign particles with the printer.
	No penetration by foreign matter.	
Paper guide path	No paper dust, etc. should be obstructing the paper guides.	Remove any foreign matter using tweezers.
Shape of the springs	No deformed springs.	Replace any deformed springs.
Lubrication status	See section 2.3.2, Lubrication Requirements	See section 2.3.3, Lubrication Points
Printing and ribbon feeding	No print defects, such as defaced, missing, or unexpected characters.	See section 2.5.3, Repair Guidelines
	No abnormally narrow or uneven line spacing	
	Smooth operation of each lever and spool gear.	
	Ribbon winding is reversed when a low ribbon supply is detected. Ribbon is properly fed.	
Shape of each part	No part should be worn, deformed, or otherwise damaged.	Replace any faulty parts.

### 1.1.4 PATTERN OF PRINT WHEEL

	13	12	11	10	9	8	7	6	5	4	3	2	1
0	0	0	0	0	0	0	0	0	0	0	@	@	
1	1	1	1	1	1	1	1	1	1	1	+	+	
2	2	2	2	2	2	2	2	2	2	2	-	-	
3	3	3	3	3	3	3	3	3	3	3	%	%	
4	4	4	4	4	4	4	4	4	4	4	◇	◇	
5	5	5	5	5	5	5	5	5	5	5	TX	TX	
6	6	6	6	6	6	6	6	6	6	6	#	#	
7	7	7	7	7	7	7	7	7	7	7	V	V	
8	8	8	8	8	8	8	8	8	8	8	CA	CA	
9	9	9	9	9	9	9	9	9	9	9	CH	CH	
10	.	.	.	.	.	.	.	.	.	.	CG	CK	
11	★	★	★	★	★	★	★	★	★	★	No	T	

## 2.2 MAINTENANCE

### 2.2.1 CLEANING

#### Removing Dirt or Stains

Wipe off the soiled sections using alcohol or benzene.

#### Removing Dirt, Scraps, and Dust

Use a vacuum cleaner to carefully draw out all foreign particles from every part of the printer is recommended.

#### NOTE :

- Never use thinner, trichloroethylene nor ketone solvents, as such use they may deteriorate or damage the plastic or rubber parts.
- Check the remaining lubrication at each cleaned area, and perform additional lubrication as required (see subsection 2.3.3, "Lubrication Points" )

### 2.2.2 INSPECTION

The maintenance and inspection procedures for this printer are grouped into two categories : 1) daily checks that can be easily performed by the operator of the printer during the course of daily work, and 2) periodic checks that can be performed only by persons having a through understanding of the printer mechanisms.

These procedures should be implemented according to the technical level of the person conducting them.

## 2.3 LUBRICATION

Lubrication plays an important role in maintaining the printer at its initial performance level throughout a long product life as well as preventing potential troubles. Make sure to apply the specified lubricant in the appropriate amounts at the specified intervals.

### 2.3.1 LUBRICANT TYPES

The type of lubricant used greatly influences the printer's performance and durability, and special attention is required to its low-temperature characteristic. Consequently, the lubricants to be used with the printer are specified by us on the basis of the results of the thorough analyses of technical data for many types of lubricants and various experiments.

Note that our specified lubricants are available in 40-cc (40-gm) plastic containers (which is the minimum supply unit).

The two types of lubricants to be used with this printer are : G-15 and G-18.

### 2.3.2 LUBRICATION REQUIREMENTS

Before applying lubricant during an assembly or disassembly procedure, be sure to first thoroughly clean the part to be lubricated. For the lubricating points and type of lubricant types, see section 2.3.3, "Lubrication Points", "Lubrication Points of Model-405R". (The numbers are used to identify lubrication points correspond to those in the table and the figure)

For the lubrication timing, apply periodic lubrications according to the following classification. If lubrication is removed due to cleaning, or after disassembly or parts replacement, be sure to perform lubricate the required parts regardless of the actual lubrication interval.

- A. To lubricated after every six months.
- B. To lubricated after overhauling or 1,000,000 after having printed lines

### 2.3.3 LUBRICATION POINTS

No.	Lubrication Point	Oil Type	Class
(1)	Frame S hole which holds the paper feeding roller shaft	G-18	B
(2)	Contact point of the paper feeding shaft spring with the paper feeding shaft (2 points)	G-18	B
(3)	Contact groove of inner paper guide with the paper feeding shaft spring	G-18	B
(4)	Shaft opening in second reduction gear	G-18	B
(5)	Platen shaft in the platen holder ass'y	G-15	A
(6)	Paper feeding second transmission gear shaft	G-18	B
(7)	Cam gear shaft	G-18	B
(8)	Intermittent gear shaft	G-18	B
(9)	Cam groove on the back of the intermittent gear (2 points)	G-18	B
(10)	Frame T's opening for the split mask spring	G-18	B

(11)	Selective transmission gear shaft	G-18	B
(12)	Cam of cam gear (2 points)	G-18	A
(13)	Cam of intermittent gear (3 points)	G-18	A
(14)	Teeth of the paper feeding gear	G-18	A
(15)	Groove in ribbon feed driving lever shaft	G-18	B
(16)	Groove in spool gear (2 points)	G-18	B
(17)	Surface where the ribbon frame rubs against the spool gear (2 points)	G-18	B
(18)	Hook of the ribbon feeding pawl spring (2 points)	G-18	B
(19)	Hook of the ribbon detecting lever spring (2 points)	G-18	A
(20)	Point where the ribbon feeding lever rubs against the ribbon feed drive lever	G-18	A
(21)	Ribbon frames guiding groove for the ribbon feeding drive lever	G-18	A
(22)	Surface where the ribbon feeding lever shaft rubs against the ribbon feeding lever	G-18	A
(23)	Surface where the ribbon feeding pawl shaft rubs against the ribbon feeding pawl	G-18	A
(24)	Surface where the ribbon feeding lever rubs against the ribbon frame	G-18	A
(25)	Point the reset lever spring of the reset lever ass'y connects with the selective pawl.	G-18	B

## 2.4 TOOLS AND LUBRICANTS

### 2.4.1 LIST OF TOOLS

No	Tool Designation	Availability
1	Electronic soldering iron	○
2	Round-cutting piles	○
3	Oblique-brade nippers	○
4	ET Holder #2.5, #5	○
5	Tweezers	○
6	Brush (medium)	○
7	Brush (fine)	○
8	Washing brush	○
9	Cross-head screwdriver No.2	○
10	Flat pliers No.2	○
11	Jig for removing #5 E-type retaining rings	◎

○ : Commercially available, ◎ : exclusive product

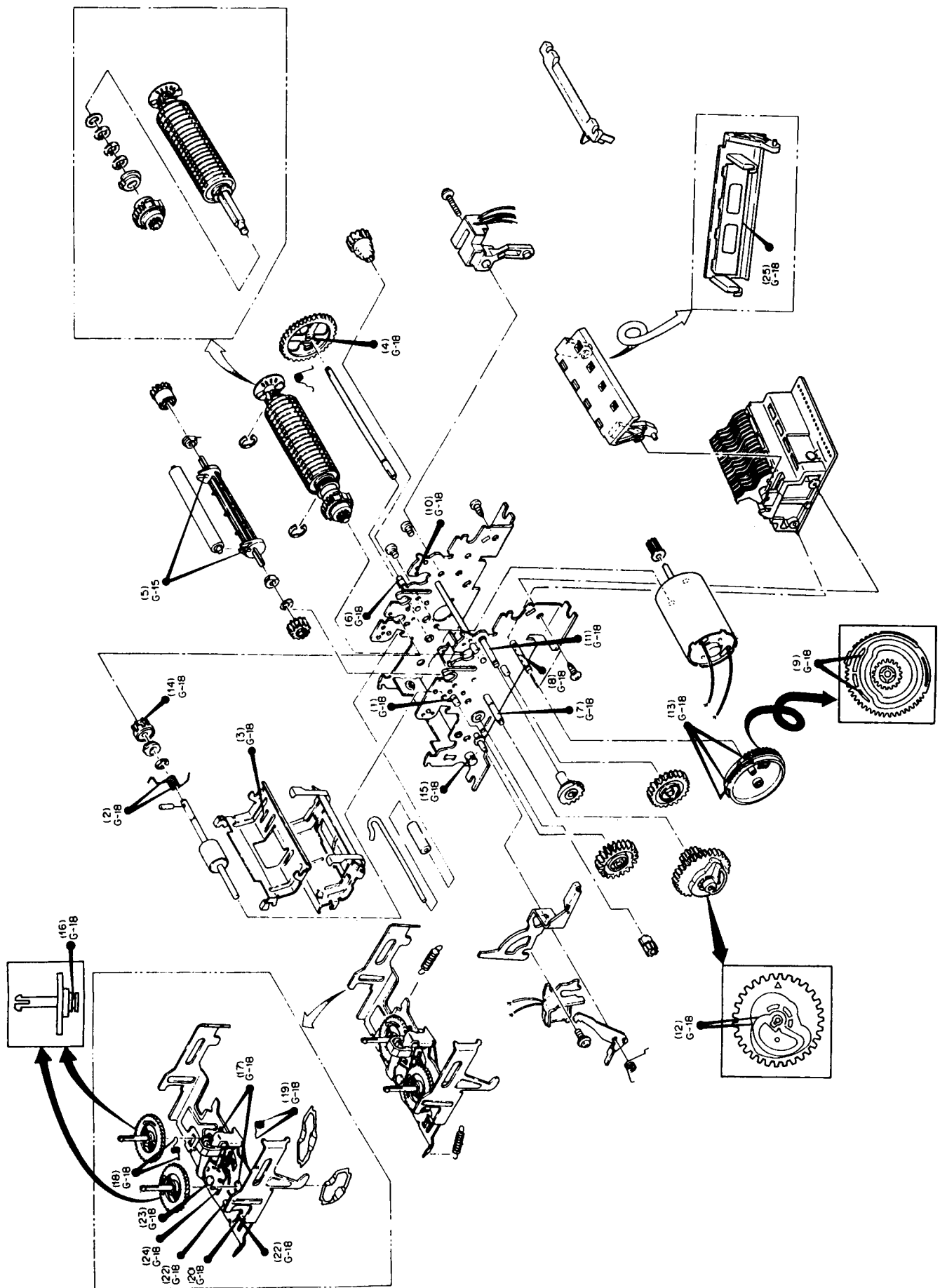


※ Jig for Removing #5 E-Type Retaining Rings

### 2.4.2 LIST OF LUBRICANTS

Item	Designation	Volume Availability
Grease	G-15	40 gm (◎)
	G-18	40 gm (◎)

◎ : Special product



Lubrication Points of Model-405R



## 2.5 REPAIR

In consideration of the level of expertise required for implementation of after-sale serving and repair procedures. For the printer such procedure have been ranked into two level's, Level A and Level B. The person in charge of repair, therefore, shall perform the repair procedures appropriate to the repair level and to his/her own level of expertise.

### 2.5.1 REPAIR LEVELS

**LEVEL A :** Requires general knowledge and technical skills regarding the operating principles and structure of the printer, but does not require previous repair experience.

**LEVEL B :** Requires certain degree of knowledge regarding the operating and skills in principles and structure of the printer, and using the assembly / disassembly tools and measuring instruments as well as previous repair experience.

### 2.5.2. REPAIR PROCEDURES

In a case trouble occur with the printer, carefully checks its symptoms and condition, clarify the source of the trouble with reference to subsection 2.5.3, "Repair Guideline" then repair the damaged area. Note that the tables of "Repair Guideline" consist of the five following items, enabling troubleshooting and repair to be performed with speed, efficiency, and minimum errors of judgement.

### 2.5.3. REPAIR GUIDELINE

#### PHENOMENON

Check the symptoms of the trouble.

#### CONDITION

Compare the condition of the trouble with the descriptions of this column and locate the matching description.

#### CAUSE

This column lists the potential causes on the basis of the trouble condition, allowing the cause of the trouble to be identified. Also refer to the repair level provided for each potential cause.

#### CHECK POINT AND METHOD

This column lists the points to be checked as well as the checking procedure to confirm the actual area causing the trouble. Be sure to inspect the check points according to the instructions in this column.

#### REPAIR METHOD

Repair the trouble area according to the instructions in this column. If the identical phenomenon and condition is unchanged after reforcing the repair, check another item of the "cause" column then perform the pertinent repair.

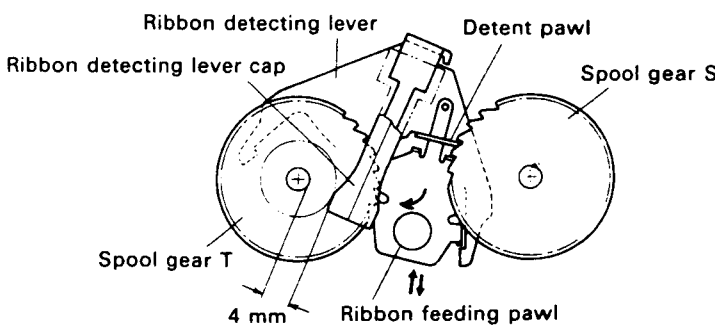
- If you wish to slowly check the operation of each gear and of the rollers and levers coupled to the gears, turn the second reduction gear in the counter-clockwise direction.

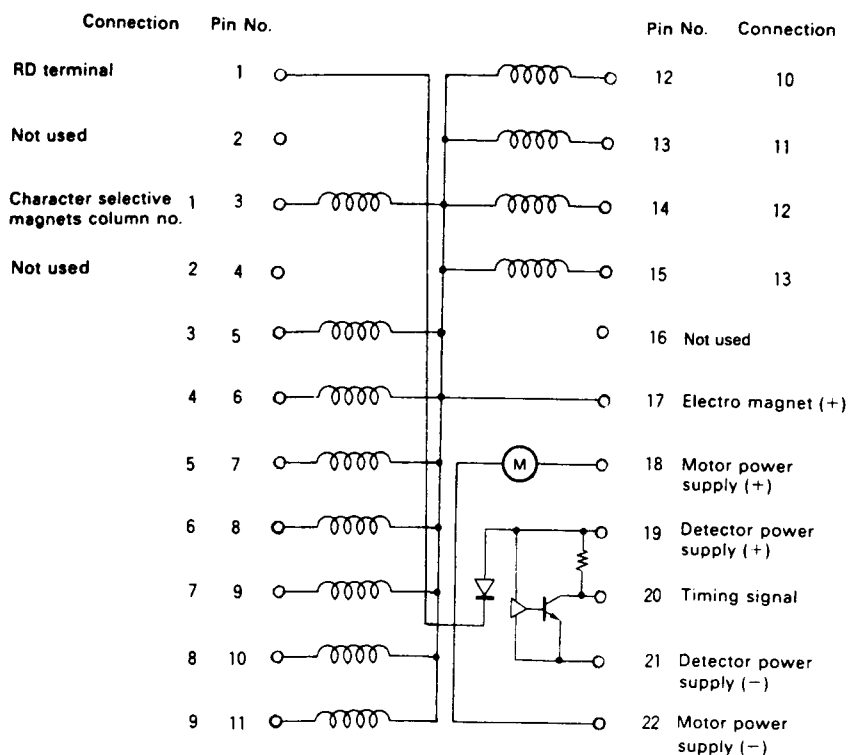
PHENOMENON	CONDITION	CAUSE	LEVEL	CHECK POINT AND METHOD	REPAIR METHOD
1. No motor rotation	The motor doesn't rotate despite receipt of a Print command	(1) Defect of power input to motor	B	<ul style="list-style-type: none"> <li>● Check the input power supply Use a tester or oscilloscope to check the input voltage between the ⊕ and ⊖ terminals of the motor power supply.</li> </ul> <p>Rating for Model-405(R) 17 VDC ± 7%</p>	● Inspect and repair the wiring of the power supply circuit board as well as the wiring board.
		(2) Faulty motor	B	<ul style="list-style-type: none"> <li>● Apply voltage to the motor terminals and check if the motor rotates.</li> </ul>	● If not, replace the motor.
2. The motor stops rotating	The motor stops rotating during a printing operation	(1) The motor speed is too slow	B	<ul style="list-style-type: none"> <li>● Use a tester or oscilloscope to check if the Timing pulses from the wiring board are within the rated pulse width.</li> </ul>	● If not, replace the motor.
3. The motor doesn't stop rotating	(1) Rotation doesn't stop after completing a print cycle	Faulty motor charge control circuit	B	<ul style="list-style-type: none"> <li>● Check if the motor stops after power input to the motor is cut off on the control circuit (calculator side).</li> </ul>	● If not, repair the motor charge control circuit.

PHENOMENON	CONDITION	CAUSE	LEVEL	CHECK POINT AND METHOD	REPAIR METHOD
3. The motor doesn't stop rotating	(2) The paper has been fed but motor rotation doesn't stop	No Timing signals are generated	B	<ul style="list-style-type: none"> <li>● Check if terminal voltage from the power supply is being supplied. Voltage: 5 to 15 V</li> <li>● If not, replace the timing detector ass'y</li> <li>● Use a galvanometer to check if current is flowing to the timing detector ass'y.</li> <li>● Check if the LED is emitting light.</li> </ul>	<ul style="list-style-type: none"> <li>● Check if the timing detector ass'y is mounted in the correct position. If not, replace the timing detector ass'y.</li> <li>● If not, adjust the mounting position of the timing detector ass'y (see section 3.3, <a href="#">Adjustment A</a>).</li> </ul>
4. No printing in any columns	The motor rotates normally, but no printing is performed	(1) Damaged common pattern in the character selective magnets and faulty soldering	B	<ul style="list-style-type: none"> <li>● Check if there is conductivity between the common pattern terminals of the character selective magnets.</li> </ul>	<ul style="list-style-type: none"> <li>● If not, perform resoldering or replace the character selective magnet unit.</li> </ul>
		(2) Faulty or improperly mounted timing detector ass'y	B	<ul style="list-style-type: none"> <li>● See CAUSE (2) of PHENOMENON 3.</li> </ul>	
		(3) Improperly mounted character selective magnet unit	B	<ul style="list-style-type: none"> <li>● Check if the side dowels on the character selective unit fit securely into the grooves in the frame unit.</li> </ul>	<ul style="list-style-type: none"> <li>● If not, adjust the mounting position (see section 3.2.2 <a href="#">Main Assembly B</a>).</li> </ul>
5. Consistently missing characters	Printing is not performed only in specific columns	(1) Damaged line in the pattern of the corresponding character selective magnet or faulty soldering	B	<ul style="list-style-type: none"> <li>● Check if there is conductivity between the common terminals of the pertinent character selective magnet.</li> </ul>	<ul style="list-style-type: none"> <li>● If not, perform resoldering or replace the character selective magnet unit.</li> </ul>
		(2) Damaged line in a coil in the character selective magnet unit	B	<ul style="list-style-type: none"> <li>● Check if the coil resistance of the pertinent character selective magnet unit is within rated values. D.C. resistance: <math>25\ \Omega \pm 10\ \Omega</math> (at 25°C)</li> </ul>	<ul style="list-style-type: none"> <li>● If not, replace the character selective magnet unit.</li> </ul>
		(3) The printing wheel guide is improperly mounted or has broken/bent teeth	A	<ul style="list-style-type: none"> <li>● Check if the typewheel guide is properly mounted and if the tooth corresponding to the missing column is broken or bent.</li> </ul>	<ul style="list-style-type: none"> <li>● If improperly mounted, re-mount it correctly. (see section 3.2.2 <a href="#">Main assembly G</a>)</li> <li>● If any teeth are broken or bent, replace the printing wheel guide.</li> </ul>
		(4) Faulty input trigger pulse	B	<ul style="list-style-type: none"> <li>● Use an oscilloscope to check if the input trigger pulse for the pertinent column is within rated values.</li> </ul>	<ul style="list-style-type: none"> <li>● If not rated or if no input trigger pulses are being generated, repair the drive control circuit.</li> </ul>
		(5) Improperly mounted character selective magnet unit	B	<ul style="list-style-type: none"> <li>● See CAUSE (3) of PHENOMENON 4.</li> </ul>	
6. Intermittently missing characters	Missing characters occur sporadically	(1) Malfunction of the print mechanism	B	<ul style="list-style-type: none"> <li>● Check if the character selective pawl operates smoothly.</li> </ul>	<ul style="list-style-type: none"> <li>● If not, replace the character selective magnet unit.</li> </ul>
	Missing characters occur sporadically	(2) The motor speed is too fast	B	<ul style="list-style-type: none"> <li>● Use a tester or oscilloscope to check if the Timing pulse from the wiring board are within the rated pulse width.</li> </ul>	<ul style="list-style-type: none"> <li>● If not, replace the motor</li> </ul>
		(3) Faulty input trigger pulses	B	<ul style="list-style-type: none"> <li>● See CAUSE (4) of PHENOMENON 5.</li> </ul>	

PHENOMENON	CONDITION	CAUSE	LEVEL	CHECK POINT AND METHOD	REPAIR METHOD
6. Intermittently missing characters		(4) The print wheel guide is improperly mounted or has broken/bent teeth	A	● See CAUSE (3) of PHENOMENON 5.	
7. The wrong characters are printed.	The printed characters are not what you expected.	(1) Malfunction of the print mechanism	B	● See CAUSE (1) of PHENOMENON 6.	
		(2) Chipped ratchet teeth on the printing wheel	B	● Check if the teeth on the pertinent typewheel are chipped.	● If chipped, replace the typewheel ass'y.
		(3) The motor speed is too fast	B	● See CAUSE (2) of PHENOMENON 6.	
		(4) Faulty input trigger pulses	B	● See CAUSE (4) of PHENOMENON 5.	
		(5) Improperly mounted character selective magnet unit	B	● See CAUSE (3) of PHENOMENON 4.	
		(6) Improperly mounted timing detector ass'y	B	● See CAUSE (2) of PHENOMENON 3.	
		(7) The printing wheel guide is improperly mounted or has broken/bent teeth	B	● See CAUSE (3) of PHENOMENON 5.	
		(8) Improperly assembled gear train on the frame T side.	B	● Check if the gear train is properly mounted.	● If not, re-assemble it correctly (see subsection 3.2.2, Main Assembly C).
8. No paper feeding.	All printing is done at one line without the paper being fed	(1) Chipped teeth or damage to the paper feeding drive gear, paper feeding second transmission gear, and/or paper feeding gear	B	● Check if each gear has chipped teeth or is damaged.	● Replace any gear with chipped teeth or damage.
		(2) Faulty supply of paper to the printer	A	● Check if the paper in use is of the rated width, thickness, and diameter. Use only the specified type of paper.	● Check for obstructions (dirt or other foreign particles) in the paper feed path. ● Remove any dirt and foreign particles.
		(3) Stretched or damaged paper feeding shaft spring	B	● Check if the paper holding spring is stretched or damaged.	● If so, replace it with a new spring.

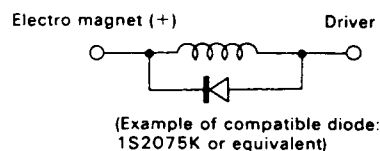
PHENOMENON	CONDITION	CAUSE	LEVEL	CHECK POINT AND METHOD	REPAIR METHOD
9. Line spacing is uneven	The spacing between printed lines is not uniform	(1) Faulty supply of paper to the printer	A	● See CAUSE (2) of PHENOMENON 8.	
		(2) Worn paper feeding roller and/or paper holding roller	B	● Check if the surface of the paper feeding roller ass'y and paper holding roller is worn.	● Replace the worn roller(s).
		(3) Stretched or damaged paper holding spring	B	● Check if the paper holding spring is stretched or damaged.	● If stretched or damaged, replace it with a new spring.
		(4) Stretched or damaged paper feed roller shaft spring	B	● See CAUSE (3) of PHENOMENON 8.	
10. The paper free mechanism doesn't work.	In standby position, the paper cannot be pulled out in the forward direction	(1) Improperly driving gear train on the frame T side	B	● In standby position, manually check if the paper feeding roller rotates forward smoothly.	● If not, re-assemble the gear train (see section 3.2.2, <u>Main Assembly A</u> ).
11. The ribbon mechanism doesn't work	The print mechanism operates normally, but the ribbon mechanism doesn't work	(1) Malfunction of the ribbon feeding drive lever	A	● Manually operate the ribbon feed driving lever, and check if it disengages from the cam gear due to the operation of or friction from the ribbon feed driving lever shaft.	● If the ribbon feed driving lever disengages, replace it.
		(2) Malfunction of ribbon feeding lever	A	● While manually operating the ribbon feeding lever, check the points below: ① Does the ribbon feeding lever grate against the ribbon feeding lever shaft? ② Is the top or bottom gap of the ribbon feeding lever so large that the ribbon feeding lever disengages from the ribbon feed driving lever? ③ Is the ribbon feeding lever deformed?	● If yes in any of the three cases, replace the ribbon unit.
		(3) Malfunction of ribbon feeding lever spring	A	● Release the ribbon feed driving lever and move the ribbon feeding lever back and forth, then check if the ribbon feeding lever is returned to its original position by the ribbon feeding lever spring.	● If not, replace the ribbon feeding lever spring.
		(4) Faulty rotation of a spool gear	A	● Check if the spool gears rotate smoothly.	● If not, replace the pertinent spool gear.
12. The ribbon is not being taken up	The ribbon feed driving lever and ribbon feeding lever operate normally, but the ribbon cannot be taken up	(1) Detached/stretched ribbon feeding pawl spring or damaged ribbon feeding pawl	A	● Check if either the ribbon feeding pawl spring is detached/stretched or if the ribbon feeding pawl is damaged.	● If the spring is detached, re-attach it; if stretched, replace it. ● If the ribbon feeding pawl is damaged, replace the ribbon unit.
	The ribbon feed drive lever and ribbon feeding lever operate normally, but the ribbon cannot be taken up	(2) Malfunction of the detent pawl	A	● Check if the ribbon detecting spring is detached or stretched.	● If the spring is detached, re-attach it; if stretched, replace it.
		(3) Worn or chipped spool gear	A	● Check if the spool gears are worn or damaged.	● Replace the worn or damaged spool gear.

PHENOMENON	CONDITION	CAUSE	LEVEL	CHECK POINT AND METHOD	REPAIR METHOD
13. The ribbon is not automatically taken up	The ribbon can be taken up in one direction, but cannot be taken up in the opposite direction.	(1) Faulty engagement between the ribbon detecting lever and ribbon feeding pawl.	A	<ul style="list-style-type: none"> <li>Remove the ribbon. With the ribbon detecting lever cap positioned 4 mm from the spool shaft, check if the ribbon feeding pawl moves toward the opposite spool when the ribbon feeding plate is actuated.</li> </ul>	<ul style="list-style-type: none"> <li>If not, replace the ribbon unit.</li> </ul>
		 <p>Diagram labels: Ribbon detecting lever, Ribbon detecting lever cap, Detent pawl, Spool gear S, Spool gear T, 4 mm, Ribbon feeding pawl.</p>			
		(2) Stretched ribbon detecting lever spring	A	<ul style="list-style-type: none"> <li>Check if the ribbon detecting lever cap on the ribbon detecting lever sufficiently presses against the ribbon.</li> </ul>	<ul style="list-style-type: none"> <li>If not, replace the ribbon detecting lever spring.</li> </ul>
		(3) Malfunction of ribbon feeding pawl	A	<ul style="list-style-type: none"> <li>See CAUSE (1) of PHENOMENON 12.</li> </ul>	
		(4) The same type of spool gear is mounted on both sides	A	<ul style="list-style-type: none"> <li>Check if spool gears T and S are correctly mounted.</li> </ul>	<ul style="list-style-type: none"> <li>If spool gears T and S are not mounted, replace the wrong spool gear with the right one.</li> </ul>

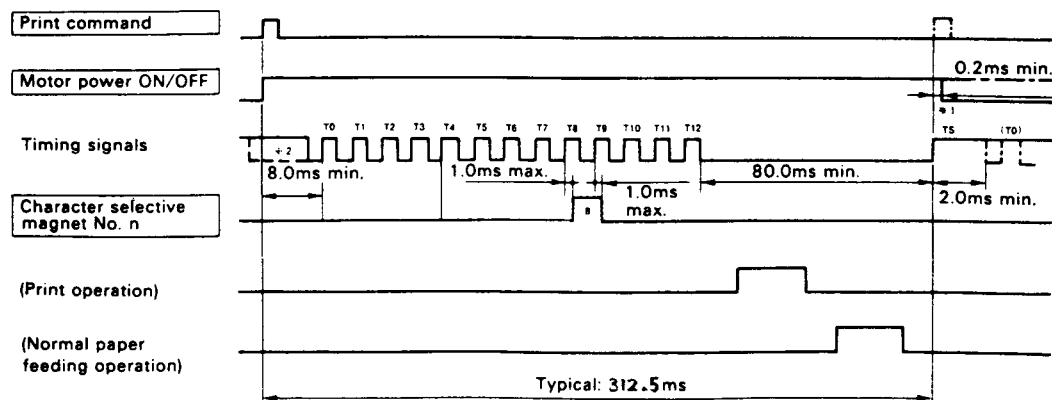


#### NOTES:

- 1) The Column Nos. match the physical arrangement of the columns on the type-wheels.
- 2) The Column Nos. are counted from 1 to 13 from the frame motor side.
- 3) The Pin Nos. are counted from 1 to 22 from the frame motor side.
- 4) The spark killer diode is connected as follows:



#### Pin Assignment of the Connector Terminals



#### NOTES:

- 1) The signals enclosed in boxes above are to be supplied by the user.
- 2) The single-dot dashed line indicated by \*1 shows timing the case of consecutively printing. In this case, the next print cycle can be started immediately after the rising edge of Timing signal TS is detected.
- 3) As shown by the dotted line indicated by \*2, the Timing signal may go LOW upon receipt of a Print command.

#### Model-405R Timing Chart

### 3.1 DISASSEMBLY

- Disassembly is performed using procedures that are opposite the assembly procedures described in section 3.2, "ASSEMBLY" .
- Disassembly printer components beyond the examples shown in "Exploded View of Model-405R" at the end of this manual may result in damage to the printer and its functions, so you are advised not to do so.
- The presence in column "Reassembly Step" of (white star) mark indicates <POINT IN DISASSEMBLY> in the "Points of Assembly Work" column, so be sure to refer to such points during disassembly work.

### 3.2 ASSEMBLY

- The assembly process is divided into subassembly and main assembly. Subassembly refers to preassembling parts to a certain extent to form units, and main assembly can be performed to assemble the units into a printer.
- The presence in column "Assembly Procedure" of a ★ (black star) mark indicates that <CHECK> or <ADJUSTMENT> is necessary. For the <ADJUSTMENT> refer to "ADJUSTMENTS" .
- Circled numbers in the "Reassembly Step" column indicate that lubrication is required during the reassembly of that component and that such lubrication will be difficult unless performed during reassembly.
- A detailed description of lubrication, including points requiring lubrication upon completion of main assembly, is given in section 2.3.3, "Lubrication Points" . Perform lubrication also with reference to "Lubrication Points of Model-405R" at the end of this manual.
- Small parts are all represented by the symbols.

#### List of Symbols for Small Parts

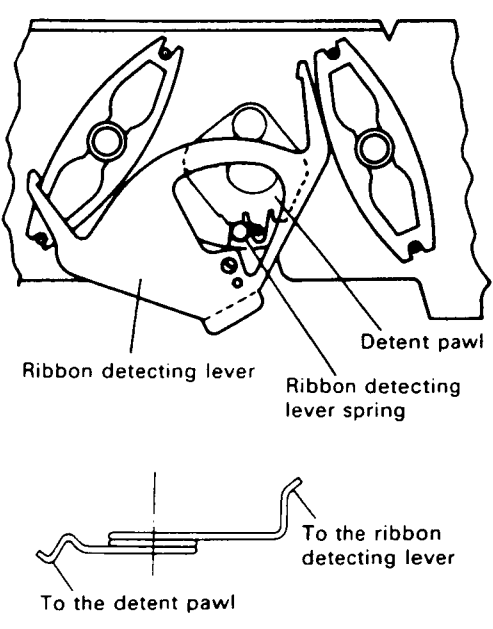
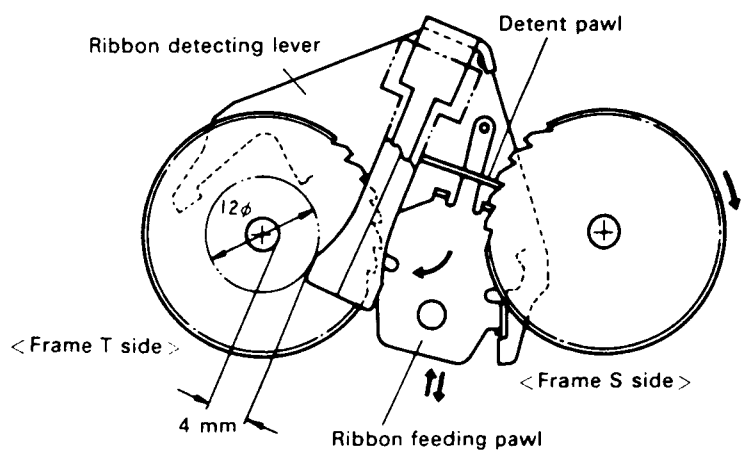
Symbol	Designation	Standard
S-1	Cup Screw	M3X4
S-2	Cross-recessed head machine screw (Bind)	M3X3
S-3	Cross-recessed head tapping screw (Bind)	M3X6
S-4	C.P. screw with Plain washer	M3X8
R-1	Retaining ring Type-E	2.3
R-2	Retaining ring Type-E	5
W-1	Leaf spring	3-0.7-7.3
W-2	Leaf spring	6-0.1-10
W-3	Plain washer	6-0.7-12
P-1	Spring pin	φ 1.5X6

### 3.2.1 Subassembly

#### Subassembly A Ribbon Unit

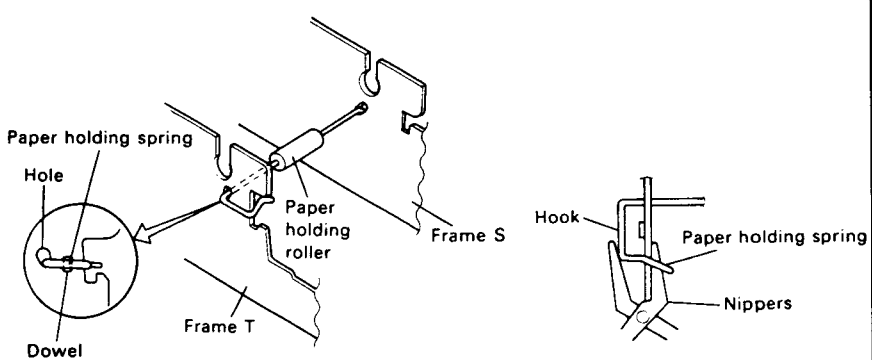
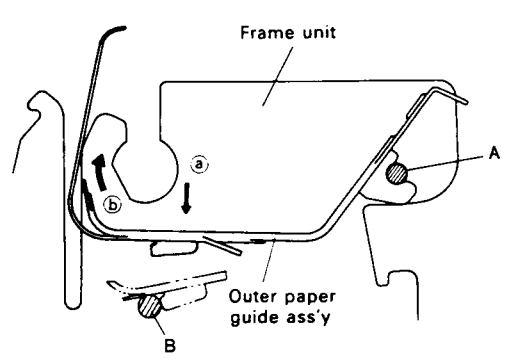
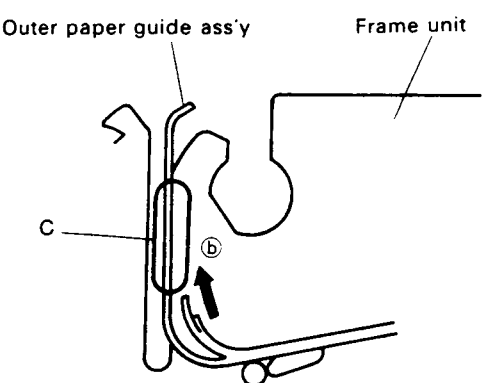
Reassembly Step	Names of Parts	Points of Assembly Work
① ② ③ 4	Ribbon frame Spool gear T Spool gear S Spool gear brake spring × 2	<ul style="list-style-type: none"> <li>● Do not confuse spool gears T and S.</li> <li>● While inserting the brake spring into the groove in the spool gear, slide it in the ➡ arrow direction to mount it onto the dowel on the back of the ribbon frame.</li> <li>● Make sure the brake springs are correctly oriented (the side with the crown faces downward).</li> </ul> <div style="text-align: center;"> <p>&lt; Frame T side &gt;                      &lt; Frame S side &gt;</p> <p>Spool gear T                      Spool gear S</p> <p>Spool gear brake spring                      Dowel</p> </div>
⑤	Ribbon feeding pawl spring	<ul style="list-style-type: none"> <li>● Attach the spring to the hole in the ribbon feeding pawl and to the ribbon detecting lever shaft.</li> </ul> <div style="text-align: center;"> <p>Spool gear T</p> <p>Ribbon detecting lever shaft</p> <p>Ribbon feeding pawl spring</p> </div>

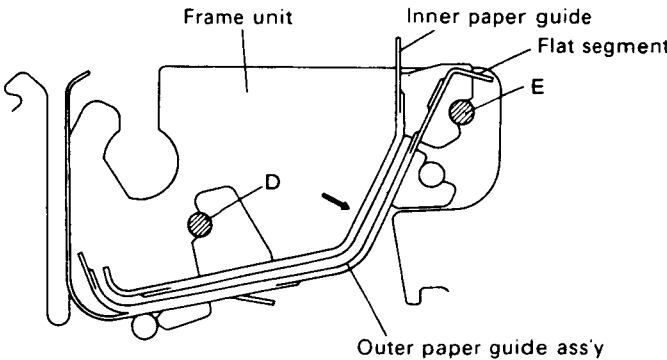
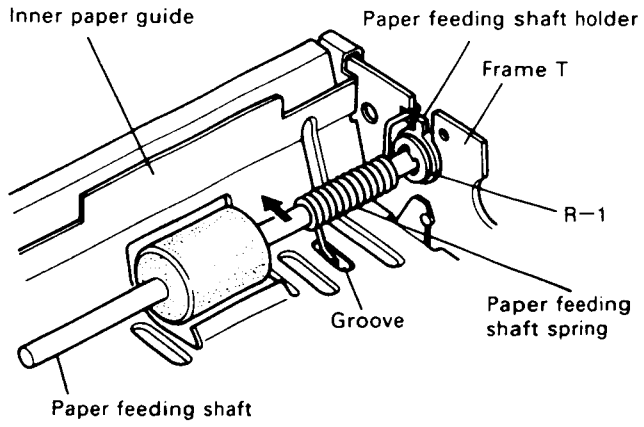


Reassembly Step	Names of Parts	Points of Assembly Work
<p>★</p> <p>⑥</p>	<p>Ribbon detecting lever spring</p>	<p>&lt; CHECK &gt;</p> <ul style="list-style-type: none"> <li>● When the ribbon feeding pawl should switch from side to side smoothly.</li> <li>● Turn the ribbon frame over, then attach the spring first to the detent pawl and then to ribbon detecting lever.</li> </ul>  <p>&lt; CHECK &gt;</p> <ul style="list-style-type: none"> <li>● Check that the spool gears are fed by one tooth for each stroke of the ribbon feeding pawl.</li> <li>● Switching of the ribbon detecting lever:             <ol style="list-style-type: none"> <li>① With the ribbon taken up onto spool gear S, move the ribbon feeding lever up and down. When the ribbon detecting lever has switched to spool gear T and is about 4 mm from the from the spool gear T shaft, check that the ribbon feeding pawl and detent pawl switch toward spool gear T.</li> <li>② With the ribbon taken up onto spool gear T, perform the same operation as above to check if the ribbon feeding pawl and detent pawl similar switch toward spool gear S.</li> </ol> </li> </ul> 

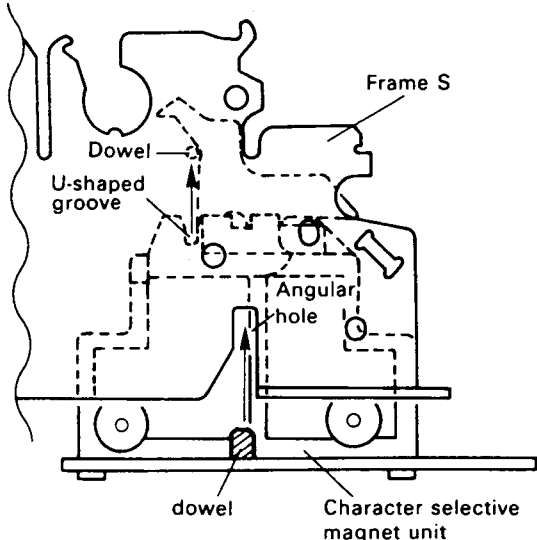
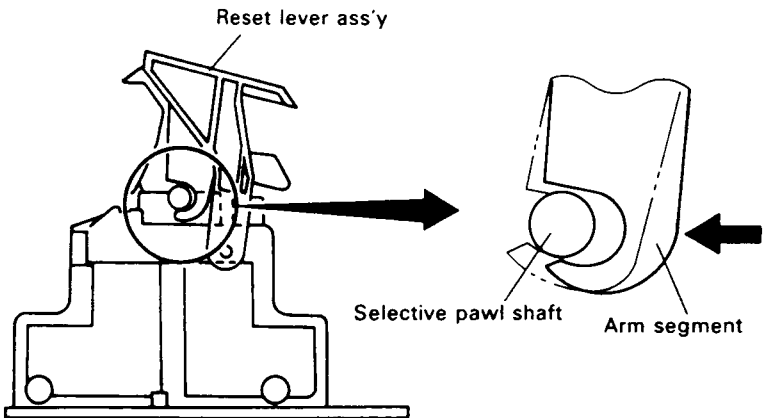
### 3.2.2 Main Assembly

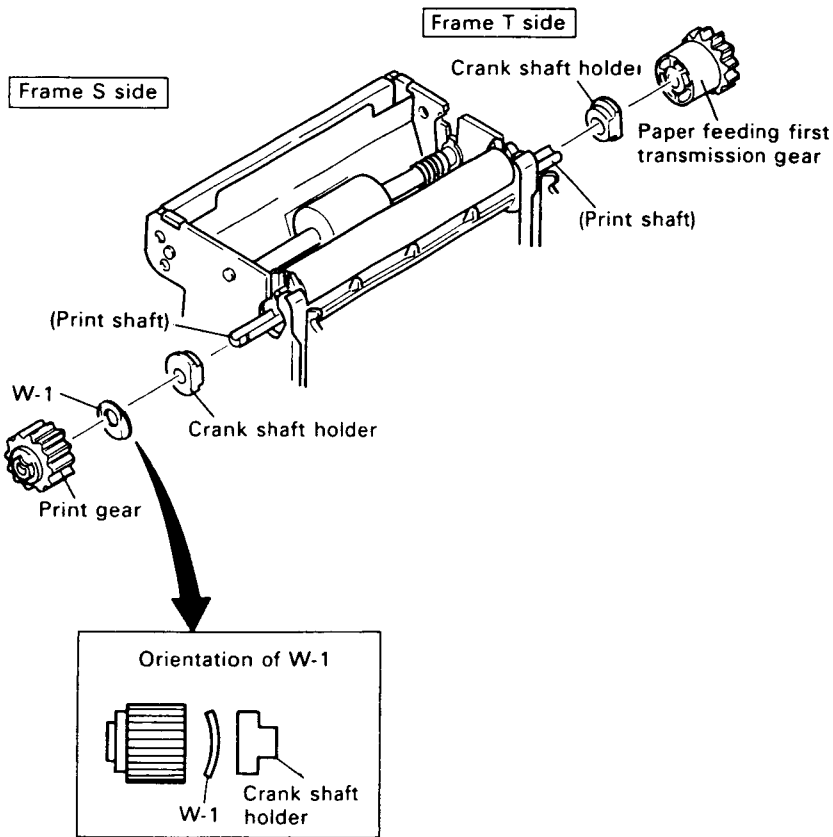
#### Main Assembly A Paper Feeding Mechanism

Reassembly Step	Names of Parts	Points of Assembly Work
① 2 3	Frame unit Paper holding spring Paper holding roller	<ul style="list-style-type: none"> <li>● Pass the paper holding spring through the hole in frame T.</li> <li>● Slide the paper holding roller onto the paper holding spring.</li> <li>● While using nippers to press the hook of the paper holding spring, pass the other end through the hole in frame S.</li> <li>● Mount the paper holding spring so it touches the bottom of the hole in frame T and is on top of the dowel.</li> </ul>  <p>&lt;POINT IN DISASSEMBLY&gt;</p> <ul style="list-style-type: none"> <li>● Use nippers to open the hook of the paper holding spring, then pull the spring out of the frame unit.</li> </ul>
☆ 4	Outer paper guide ass'y	<ul style="list-style-type: none"> <li>● Set the outer paper guide ass'y onto pin A inside the frame unit, then rotate it in the ➡ arrow (a) direction around the fulcrum point of pin A to secure it onto pin B.</li> </ul>  <ul style="list-style-type: none"> <li>● Section C of the outer paper guide ass'y should fit tightly against the frame unit.</li> </ul> 

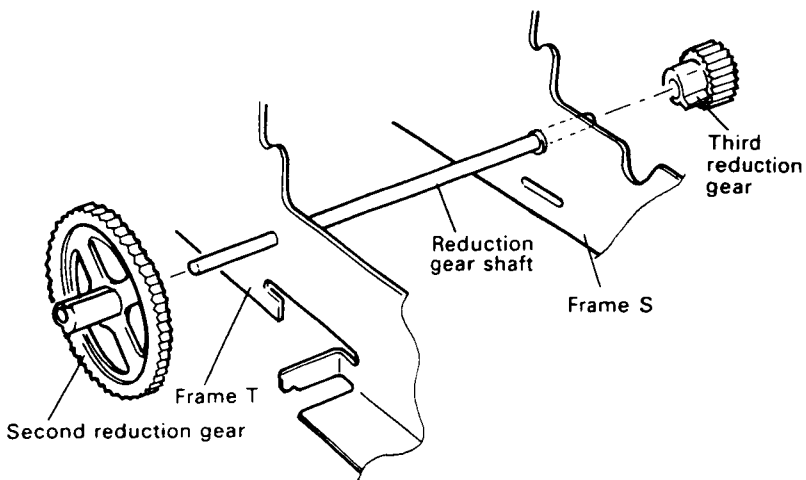
Reassembly Step	Names of Parts	Points of Assembly Work
☆		<p>&lt; POINT IN DISASSEMBLY &gt;</p> <ul style="list-style-type: none"> <li>● To remove the outer paper guide ass'y, rotate it in the ➡ arrow (b) direction indicated in the preceding figure.</li> <li>● Set the inner paper guide onto pin D in the frame unit, then press it in the ➡ arrow direction to secure its upper flat segment onto pin E.</li> </ul>
5	Inner paper guide	 <p>Labels in diagram: Frame unit, Inner paper guide, Flat segment, E, D, Outer paper guide ass'y</p>
6	① Paper feeding roller ② Paper feeding shaft spring ③ Paper feeding shaft holder ④ Paper feeding gear SP (φ1.5x6) × 1 R-1 (2.3) × 1	<ul style="list-style-type: none"> <li>● After assembling parts ① to ④, mount the subassembly onto the frame unit as follows.</li> <li>● Mount parts ② to ④ on the grooved side of the paper feeding shaft.</li> <li>● After pressing SP onto the shaft, fit SP securely into the groove in the paper feeding gear.</li> <li>● After parts ① to ④ are assembled, mount this subassembly into the frame unit.</li> <li>● Fit one end of the paper feeding shaft spring into the groove in frame T and the other end into the groove on the inner paper guide.</li> <li>● Mount the paper feeding shaft holder from the inside of frame T, then tighten R-1.</li> </ul> <p>&lt; CHECK &gt;</p> <ul style="list-style-type: none"> <li>● The paper feeding roller should rotate smoothly.</li> <li>● Press the paper feeding roller shaft several times in the ➡ arrow direction to check that it slides lightly.</li> </ul>  <p>Labels in diagram: Inner paper guide, Paper feeding shaft holder, Frame T, R-1, Paper feeding shaft spring, Groove, Paper feeding shaft</p>

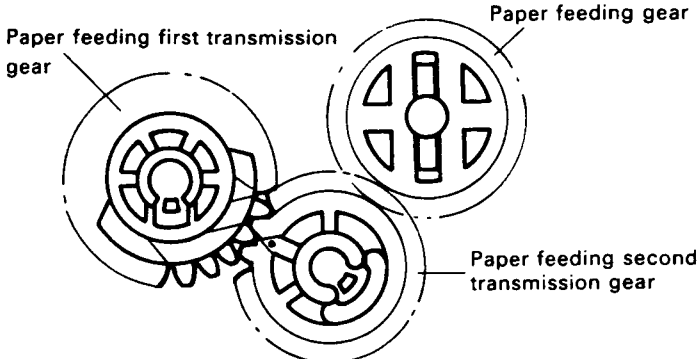
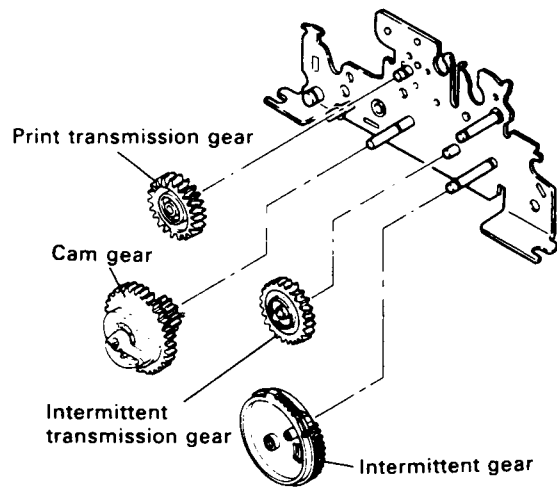
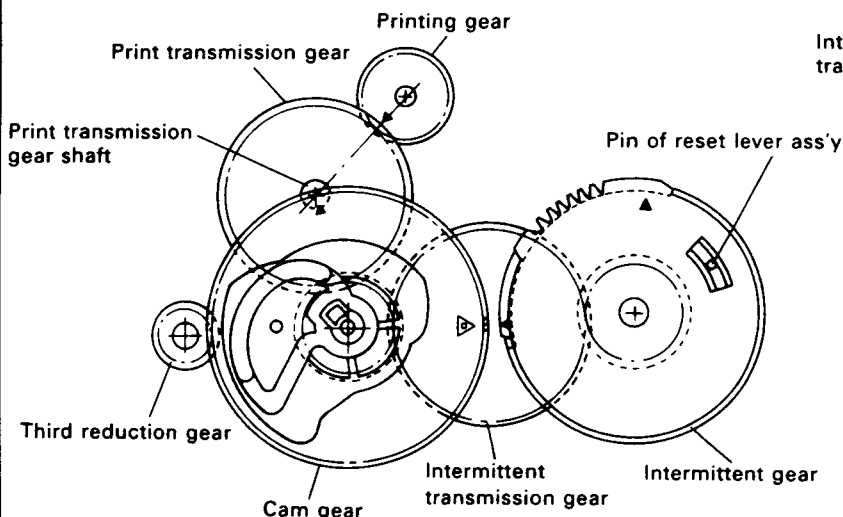
## Main Assembly B Print Mechanism

Reassembly Step	Names of Parts	Points of Assembly Work
1	Character selective magnet unit	<ul style="list-style-type: none"> <li>While aligning the dowels of the character selective magnet unit with the angular holes in frames S and T, press it down carefully until the dowels on frames S and T fit into the character selective magnet unit's U-shaped grooves, then tighten S-4. (Screw-tightening torque: 8 kg/cm)</li> </ul> 
2	Reset lever ass'y	<ul style="list-style-type: none"> <li>Fit the two arms (S and T sides) of the reset lever ass'y onto the shaft of the selective pawl shaft in the character selective magnet unit.</li> </ul> 
☆		<p>&lt; POINT IN DISASSEMBLY &gt;</p> <ul style="list-style-type: none"> <li>To remove the character selective magnet unit, the reset lever ass'y must press the gear until it clicks into place.</li> </ul>
6	Crank shaft holder ×1 W-1 (3-0.7-7.3) ×1	<ul style="list-style-type: none"> <li>Slide the holder onto the T side of the print shaft and mount it from the outside of frame T.</li> <li>Make sure W-1 is correctly oriented.</li> </ul>
7	Paper feeding first transmission gear	<ul style="list-style-type: none"> <li>Align the paper feeding first transmission gear so that it matches the shape of the T end of the print shaft, then press the gear until it clicks into place.</li> </ul>

Reassembly Step	Names of Parts	Points of Assembly Work
		


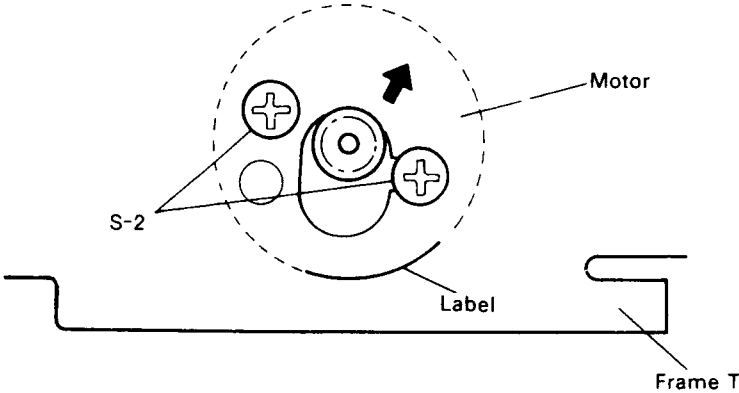
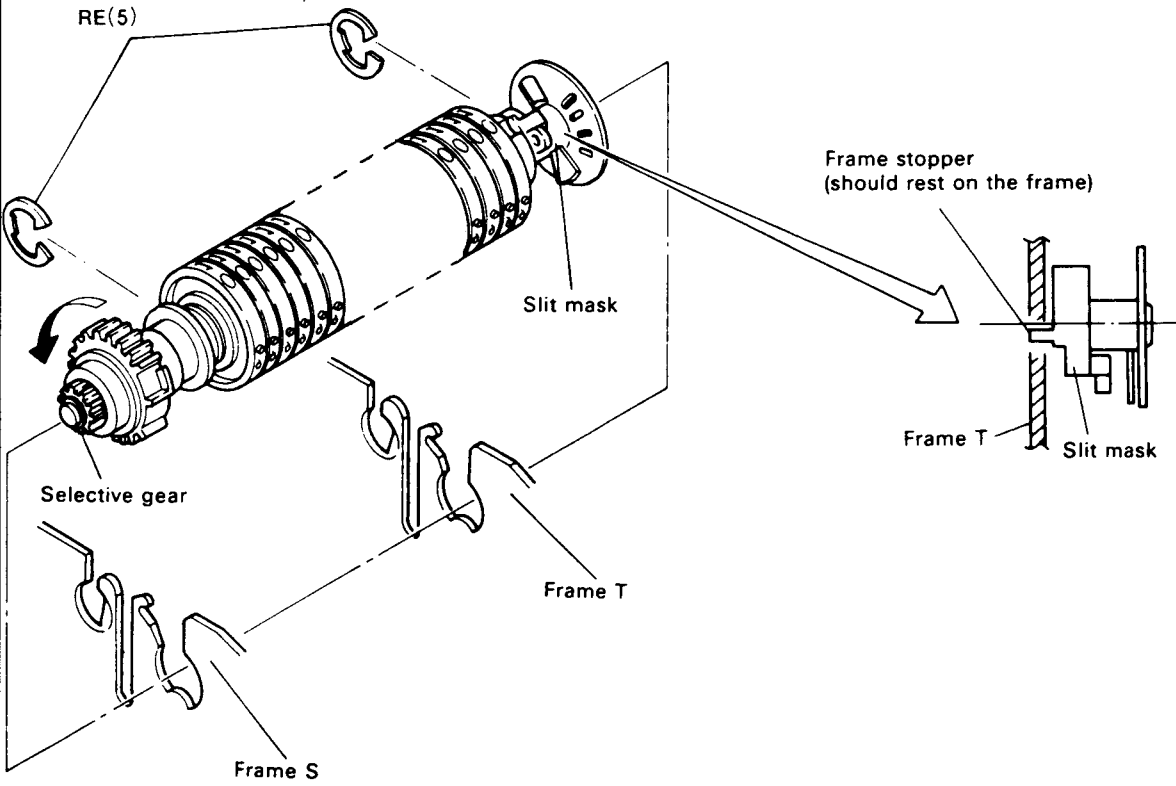
## Main Assembly C Gear Trains

Reassembly Step	Names of Parts	Points of Assembly Work
1 ② 3	Reduction gear shaft Second reduction gear Third reduction gear	<ul style="list-style-type: none"> <li>● Pass the shaft through the holes in both sides of the frame unit.</li> <li>● Align each gear so that its shape fits the corresponding end of the reduction gear shaft, then press each gear until it clicks into place.</li> </ul> 

Reassembly Step	Names of Parts	Points of Assembly Work
4	Paper feeding second transmission gear	<ul style="list-style-type: none"> <li>Align the phases of the paper feeding first transmission gear and paper feeding second transmission gear as shown in the figure below, then press the paper feeding second transmission gear until it clicks into place.</li> </ul>
		
⑤	Print transmission gear	<ul style="list-style-type: none"> <li>Align the print gear so that its ▼ mark faces the center of the print transmission gear shaft.</li> </ul>
6	Intermittent transmission gear	<ul style="list-style-type: none"> <li>This gear (black) requires no distinction of its front or back surfaces.</li> </ul>
⑦	Cam gear	<ul style="list-style-type: none"> <li>This gear (gray) requires no distinction of its front and back surfaces.</li> </ul>
⑧	Intermittent gear	<ul style="list-style-type: none"> <li>Align the cam gear so that its ▲ mark faces the center of the print transmission gear shaft, then press the cam gear until it clicks into place.</li> <li>Align the " " mark on the cam gear and the " " mark on the intermittent gear so that they face each other, then press the intermittent gear until it clicks into place.</li> <li>Make sure the lever pin of the reset lever ass'y fits into the opening in the intermittent gear.</li> </ul>
		
		

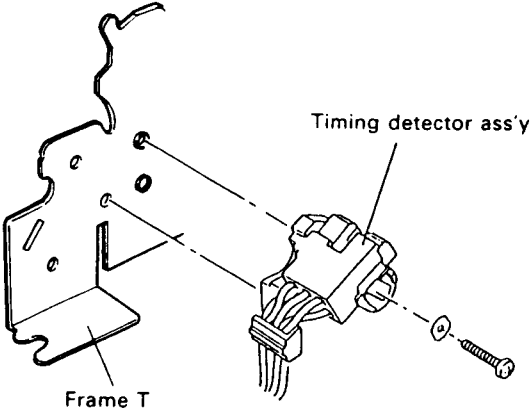
Reassembly Step	Names of Parts	Points of Assembly Work
<div data-bbox="188 763 212 786" style="text-align: center;">☆</div> <div data-bbox="188 853 212 875" style="text-align: center;">3</div>	<div data-bbox="288 853 480 875" style="text-align: center;">Slit mask spring</div>	<div data-bbox="608 282 1437 674"> </div> <div data-bbox="592 689 1453 909"> <ul style="list-style-type: none"> <li>● After setting the printing wheel ass'y, rotate the selective gear in the counter-clockwise direction until it stops.</li> </ul> <p>&lt;POINT IN DISASSEMBLY&gt;</p> <ul style="list-style-type: none"> <li>● To remove R-2, use the jig for removing E-type retaining rings (our exclusive jig).</li> <li>● Attach the ends of the slit mask spring to the slit mask and the hole in frame T.</li> </ul> </div> <div data-bbox="778 920 1262 1200"> </div>
<div data-bbox="188 1227 212 1249" style="text-align: center;">④</div>	<div data-bbox="288 1227 560 1283" style="text-align: center;">Selective transmission gear</div>	<div data-bbox="592 1227 1453 1507"> <ul style="list-style-type: none"> <li>● Make sure that the selective gear has been rotated as far as it will go in the counter-clockwise direction.</li> <li>● Align the selective transmission gear's " " mark with the " " mark of the intermittent gear, align the selective transmission gear's " " mark with the " " mark of the selective gear, then press the selective transmission gear until it clicks into place.</li> <li>● If the selective transmission gear cannot be fully seated, rotate it by 90° by pressing the second reduction gear in the  arrow direction, then try pressing the selective transmission gear into place.</li> </ul> </div> <div data-bbox="592 1514 831 1536"> <p>&lt;Phase alignment&gt;</p> </div> <div data-bbox="762 1547 1273 2018"> </div>

## Main Assembly D Motor and Typewheel Ass'y

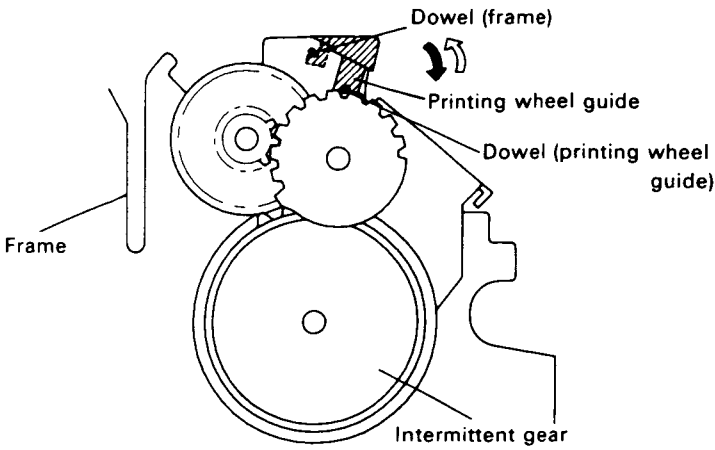
Reassembly Step	Names of Parts	Points of Assembly Work
1	① Motor ② First reduction gear S-2 (M3×3) ×2	<ul style="list-style-type: none"> <li>● Assemble parts ① and ②, then mount them into frame T as follows.</li> <li>● With the label on the motor ass'y facing downward, tighten the screws while pressing the motor ass'y in the  arrow direction.</li> </ul>  <ul style="list-style-type: none"> <li>● Solder the lead wires from the motor (see <a href="#">Main Assembly H</a> Soldering).</li> <li>● Check the phase alignment of the intermittent gear (see <a href="#">Main Assembly C</a>).</li> </ul>
2	Printing wheel ass'y R-2 (5) × 2	<ul style="list-style-type: none"> <li>● With the slit mask's frame stopper on top, align the print wheel ass'y so that frame T fits between the slit mask and the print wheel shaft holder and that frame S fits between the selective gear and the print wheel shaft holder.</li> <li>● Set both print wheel shaft holders securely into the frame unit from the inside, then tighten R-2.</li> </ul> 



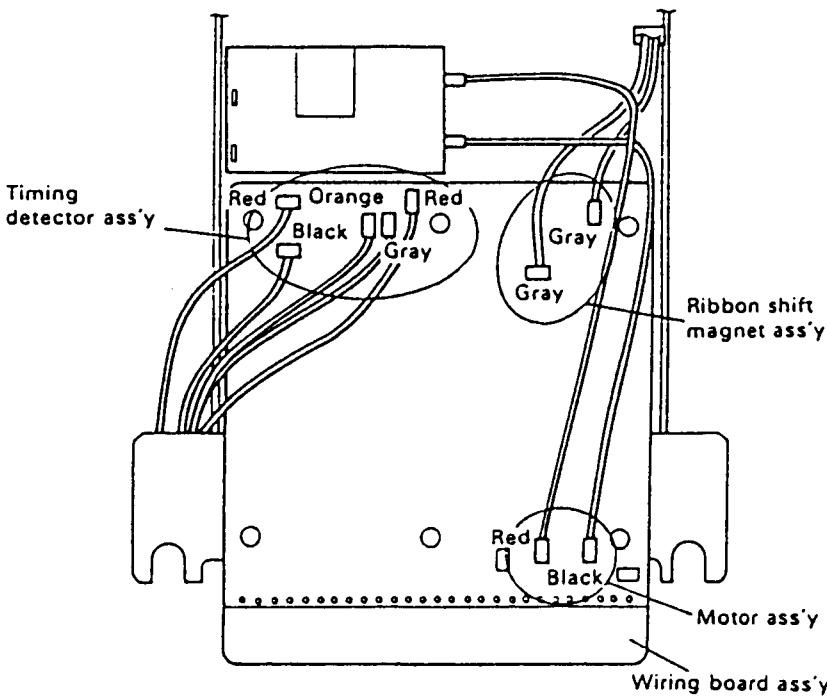
## Main Assembly E Timing Detector Ass'y

Reassembly Step	Names of Parts	Points of Assembly Work
1 ★	Timing signal detector ass'y S-4 (M3×18) × 1	<ul style="list-style-type: none"> <li>● Set the dowel of the timing detector ass'y into the hole in frame T, then temporarily tighten S-4.</li> <li>&lt;ADJUSTMENT&gt;</li> <li>● Adjust the position of the timing detector ass'y (see section 3.3, <u>Adjustment A</u>).</li> </ul> 

## Main Assembly G Typewheel Guide

Reassembly Step	Names of Parts	Points of Assembly Work
1	Typewheel guide	<ul style="list-style-type: none"> <li>● Place the typewheel guide on the dowels on the inside of the frame, then mount by rotating it in the ↻ arrow direction around the fulcrum point of the dowels.</li> <li>● Make sure the dowel on the frame S side of the typewheel guide is inside the hole in frame S.</li> <li>&lt;POINT IN DISASSEMBLY&gt;</li> <li>● To remove the typewheel guide, rotate it in the ↻ arrow direction around the fulcrum point of the dowels.</li> </ul> 

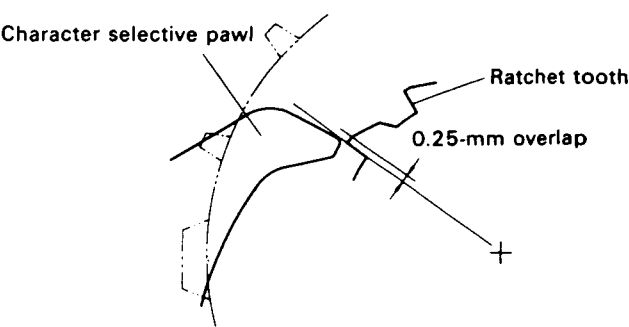


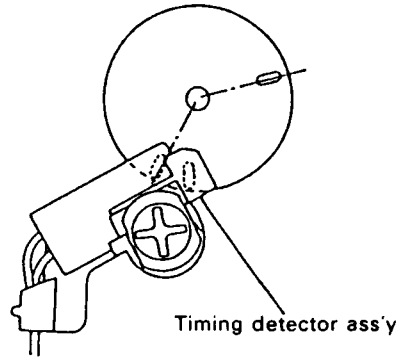
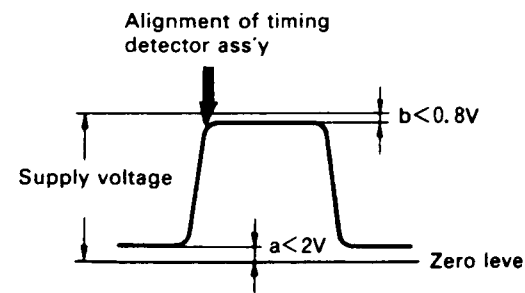
## Main Assembly H Soldering

Reassembly Step	Names of Parts	Points of Assembly Work
	(Motor) (Timing detector ass'y) (Ribbon shift magnet ass'y)	<p>● Perform soldering so that the lead wires of the motor ass'y are above those of the ribbon shift magnet ass'y.</p>  <p>The diagram illustrates the wiring connections for the Motor ass'y, Timing detector ass'y, and Ribbon shift magnet ass'y to the Wiring board ass'y. The Motor ass'y is located at the bottom right, with its lead wires (Red, Black, and Gray) connected to the Wiring board ass'y. The Timing detector ass'y is located at the top left, with its lead wires (Red, Orange, Black, and Gray) connected to the Wiring board ass'y. The Ribbon shift magnet ass'y is located at the top right, with its lead wires (Gray) connected to the Wiring board ass'y. The diagram shows the physical layout of the components on the board, with the Motor ass'y positioned below the Timing detector ass'y and the Ribbon shift magnet ass'y.</p>

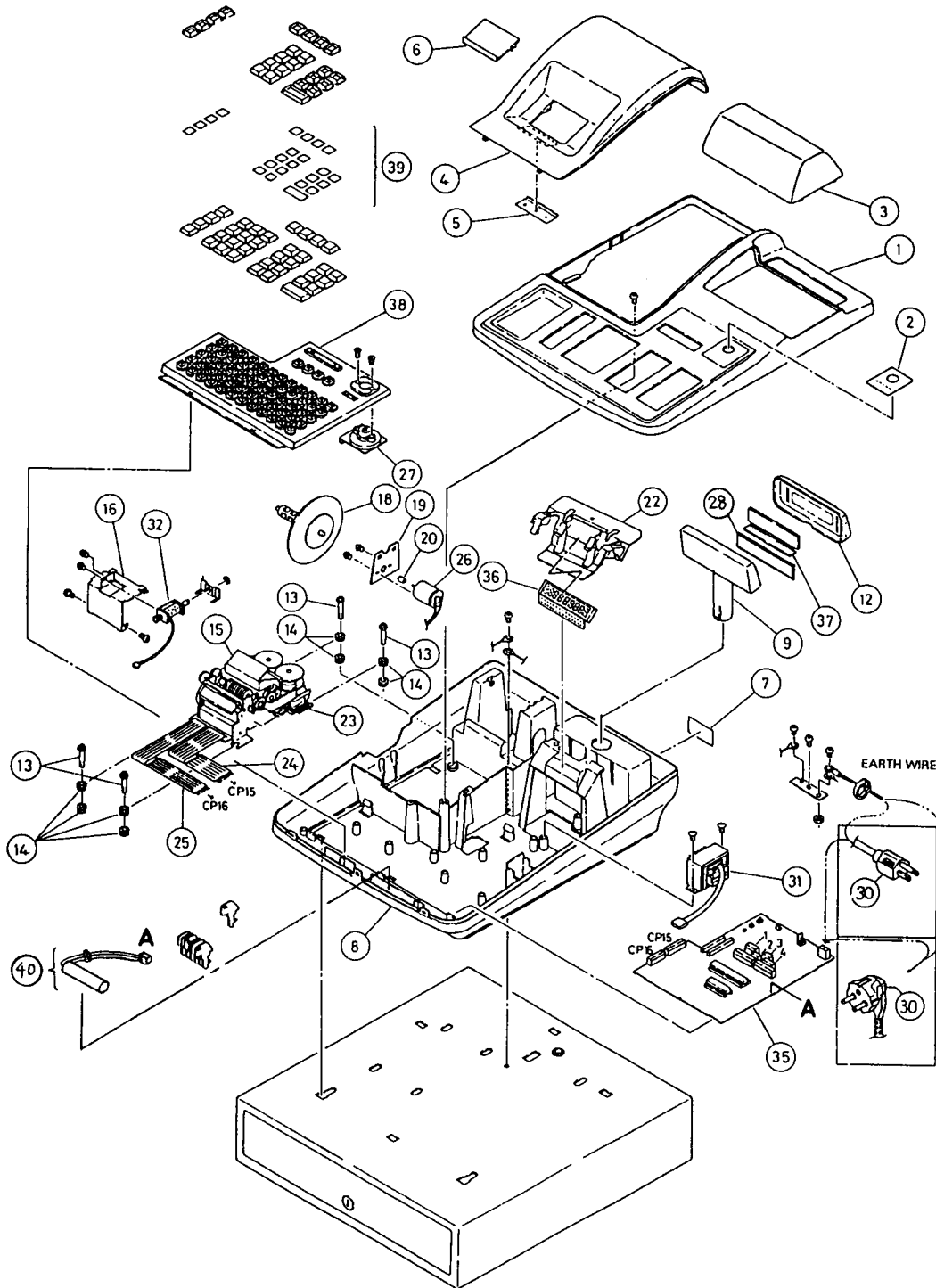
### 3.3 ADJUSTMENTS

- For the adjustment required in printer assembly, refer to Adjustment A and B in the following.
- All adjustments are made when the printer is manufactured at the factory. However, if parts are disassembled or replaced for maintenance or repair, the pertinent adjustments must be performed for normal operation of the printer.

#### Adjustment A Position of the Timing Detector Ass'y

Adjustment Step	Description	Points in Adjusting
1	<ul style="list-style-type: none"> <li>● Manually rotate the second reduction gear until the desired ratchet teeth of the printing wheel ass'y are aligned with the tip of the character selective pawls.</li> </ul>	 <p>Character selective pawl</p> <p>Ratchet tooth</p> <p>0.25-mm overlap</p>
2	<ul style="list-style-type: none"> <li>● Apply the rated voltage to the timing detector ass'y, then use an oscilloscope to observe the output waveforms.</li> <li>● Loosen the setscrew S-4 (M3×8) of the timing detector ass'y, then rotate the timing detector ass'y in the  arrow direction. At this time, the output waveforms should change to LOW level.</li> <li>● When the timing detector ass'y is rotated in the opposite direction, the output waveforms should change to HIGH level.</li> <li>● Slowly rotate the timing detector ass'y again in the  arrow direction, then tighten its setscrew to mount it at the position just before the output waveforms change from HIGH to LOW level. (Screw-tightening torque: 3 kg/cm)</li> </ul>	 <p>Timing detector ass'y</p>
3	<ul style="list-style-type: none"> <li>● Use the oscilloscope to check the output voltage of the Timing signals. Reference: Zero level a: Less than 2 V b: Less than <math>0.8 \text{ V} &lt; 0.8 \text{ V} &lt; a &lt; 2 \text{ V}</math></li> </ul>	 <p>Alignment of timing detector ass'y</p> <p>Supply voltage</p> <p>Zero level</p> <p><math>a &lt; 2V</math></p> <p><math>b &lt; 0.8V</math></p>

## 17. EXPLODED VIEW



1. Cabinet Ass'y	14. Rubber Cushion	27. Lock Switch Ass'y
2. Name Plate, Mode	15. Underlay Plate	30. AC Cord Ass'y
3. Filter, Front	16. Bracket, Stamp	31. Power Trans., Ass'y
4. Printer Cover	18. Reel	32. Stamp Solenoid
5. Paper Cutter	19. Bracket, Motor	35. M1 PCB Ass'y
6. Clear Window	20. Spacer, Motor	36. M2 PCB Ass'y (Front)
7. Rating Label	22. Bracket, Display Tube	37. M3 PCB Ass'y (Rear)
8. Bottom Lid Ass'y	23. Printer Ass'y	38. Keyboard
9. Back Lid Ass'y	24. Jumper Lead, 12P	39. Key Sheet Ass'y
12. Filter, Rear	25. Jumper Lead, 10P	40. Nicd Cell Ass'y
13. Special Screw	26. DC Motor Ass'y	

## 18. PARTS LIST

### PRODUCT SAFETY NOTICE

Each precaution in this manual should be followed during servicing. Components identified with the IEC symbol  $\triangle$  in the parts list and the schematic diagram designate components in which safety can be of special significance. When replacing a component identified with  $\triangle$ , use only the replacement parts designated, or parts with the same ratings of resistance, wattage or voltage that are designated in the parts list in this manual. Leakage-current or resistance measurements must be made to determine that exposed parts are acceptably insulated from the supply circuit before returning the product to the customer.

Ref. No.	PART No.	DESCRIPTION	Qty
<b>INDIVIDUAL</b>			
	632 755 1768	OUTER CARTON	1
	632 754 9680	STYRO-FOAM CUSHION, FRONT	1
	632 754 9697	STYRO-FOAM CUSHION, REAR	1
	632 731 9641	LABEL, BARCODE	1
	632 755 0273	COVER, UNIT	1
	632 759 5014	POLYETHYLENE BAG, 110X400 AC CORD	1
	632 754 9703	POLYETHYLENE BAG, 280X410 INSTRUCTION MANUAL	1
	632 754 9710	POLYETHYLENE BAG, L 90X170 KEY	1
	632 754 9727	POLYETHYLENE BAG, L 80X120 STAMP (USA/GERMANY/GENERAL)	1
	632 755 1775	INSTRUCTION MANUAL ENGLISH	1
	632 755 2154	INSTRUCTION MANUAL GERMANY	1
	632 755 2161	INSTRUCTION MANUAL SPANISH/FRENCH (GENERAL)	1
	632 772 0492	INSTRUCTION MANUAL FRENCH (CANADA)	1
	632 754 9734	ROLL PAPER	1
	632 249 9959	STAMP, ENGLISH (USA, GERMAN, GENERAL)	1
	632 250 3403	INK RIBBON	1
	632 770 9503	LABEL, NI-CD, OUTER CARTON (USA)	1
	632 681 7940	LEAFLET, BATTERY (USA)	1
	632 778 8164	STICKER, PR-POP, CARTON (CANADA)	1
	632 772 0515	LEAFLET, PROGRAM (CANADA)	1
	632 778 8171	STICKER, CALL-POP, CARTON (CANADA)	1
	632 667 5205	KEY TOP ASS'Y, SINGLE-SIZE (USA)	8
	632 754 9710	POLYETHYLENE BAG, L 90X170 KEY TOP ASS'Y (USA)	1
	632 755 1041	KEY SHEET (GER. / SPA. / FRE.)	1
<b>CABINET</b>			
1	632 779 7494	CABINET ASS'Y	1
1-1	632 754 9741	CABINET	1
1-2	632 755 1782	NAME PLATE, MODE	1
1-3	632 754 9758	FILTER	1
4	632 779 7517	PRINTER COVER ASS'Y	1

Ref. No.	PART No.	DESCRIPTION	Qty
4-1	632 754 9765	PRINTER COVER	1
5 (4-2)	632 758 8276	PAPER CUTTER	1
6	632 316 9646	CLEAR WINDOW	1
7	632 759 5021	RATING LABEL, BOTTOM LID	1
	411 169 2604	SCR S-TPG BIN 3X8 CABINET - BOTTOM LID	1
	411 025 6500	SCR S-TPG BIN 3X8 CABINET - BOTTOM LID	1
	411 001 8900	SCR BIN 3X8 CABINET - BOTTOM LID	1
<b>CHASSIS</b>			
8	632 754 9772	BOTTOM LID	1
9	632 754 9789	BACK LID, CUSTOMER B	1
12	632 754 9796	FILTER, CUSTOMER	1
13	632 643 9388	SPECIAL SCREW, PRINTER	4
14	632 757 0134	RUBBER CUSHION, PRINTER	8
15	632 759 5045	UNDERLAY PLATE, PRINTER	1
16	632 759 5090	BRACKET, STAMP (USA/GENERAL/GERMANY)	1
	411 036 5301	SCR PAN+SW+W 3X6 BRACKET STAMP - SOLENOID (USA/GENERAL/GERMANY)	2
18	632 308 3744	REEL	1
19	632 759 5106	BRACKET, MOTOR	1
	411 045 4807	SCR PAN+SW 3X4 MOTOR - BRACKET	2
20	632 652 2820	SPACER	1
	411 025 5206	SCR S-TPG BIN 3X10 AC CORD BRACKET	2
	411 098 0405	SCR S-TPG PAN+FLG 4X8	2
	411 001 2304	SCR S-TPG BIN 4X10 BOTTOM LID - DRAWER	1
22	632 754 9802	BRACKET, DISPLAY TUBE, B FRONT DISPLAY	1
28	632 754 9819	BRACKET, DISPLAY TUBE REAR DISPLAY	1
<b>CHASSIS ELC.</b>			
23	632 755 1805	PRINTER ASS'Y, 405R-01	1
	632 754 9826	JUMPER LEAD, 12P, 200MM PC JOINER, CP15	1
	632 754 9833	JUMPER LEAD, 10P, 230MM PC JOINER, CP16	1
26	632 755 3847	DC MOTOR ASS'Y	1
26-1	632 635 0744	DC MOTOR	1
26-2	632 755 1829	WIRE HARNESS, 2P MOTOR	1
27	632 664 1002	LOCK SWITCH ASS'Y, M. LOCK	1
27-1	632 664 5277	LOCK SWITCH	1

NOTES : 1. Part orders must contain Model Number, Part Number and Description.  
2. Ordering quantity of screws and resistors must be multiple of 10 pcs.

Ref. No.	PART No.	DESCRIPTION	Qty
27-1-1	632 627 2510	LOCK, LOCK - CYLINDER	1
27-1-2	632 664 5383	KEY ASS'Y, (R.Z.P X 2, X.M X 1)	1
27-2	632 652 9386	CONNECTOR, 11P	1
30   △	632 755 3854	AC CORD ASS'Y FOR 120V DESTINATION (USA/CANADA)	1
30   △	632 755 2178	AC CORD ASS'Y FOR 230V DESTINATION (GENERAL/GERMAN)	
31   △	632 755 1836	POWER TRANSFORMER ASS'Y FOR 120V DESTINATION, DC17.6V	1
31   △	632 755 2185	POWER TRANSFORMER ASS'Y FOR 230V DESTINATION, DC17.6V	
32	632 755 2802	SOLENOID, STAMP (USA/GENERAL/GERMAN)	1
	632 755 1843	EARTH WIRE - 2, 300 MM	1
	632 755 1850	EARTH WIRE - 1, 150 MM	1
	411 090 7105	WASHER Y, 4X10X1 PRINTER EARTH	1
	411 036 5301	SCR PAN+SW+W 3X6 PRINTER EARTH	1
	632 734 7057	BAND, WIRE, for DRAWER CABLE	1
40   △	632 755 1867	NICD CELL ASS'Y, 3N-50AAAS 3.6 V, 45 mAh	1
	632 770 9510	LABEL - RBRC, NI-CD (USA)	1
<b>PC BOARD 1</b>			
35	632 755 2017	PW BOARD ASS'Y, M1 FOR 120V DESTINATION (USA/CANADA)	1
35	632 755 2192	PW BOARD ASS'Y, M1 FOR 230V DESTINATION (GENERAL/GERMAN)	1
F1, F2	632 621 2363	HOLDER, FUSE	4
F1   △	423 022 2508	FUSE, 250 V 0.8 A (USA/CANADA)	1
F1   △	423 003 2701	FUSE, 250 V 0.4 A (GENERAL/GERMAN)	1
F2   △	423 005 8701	FUSE, 125 V 2A FOR 120 V / 230 V DESTINATION	1
L1   △	632 716 7990	CHOKE COIL	1
T1	632 644 2616	INVERTER TRANSFORMER	1
X2	632 501 9673	CERAMIC OSC., 4.19 MHZ	1
X1	632 250 7579	CRYSTAL OSC., 32.768 KHZ	1
BZ1	420 001 4904	PZ BZR 78PZ222000-PA	1
CP1   △	632 629 1894	PLUG, 2P	1
CP2   △	632 253 7897	PLUG, 3P	1
CP3	632 253 7163	PLUG, 2P	1
CP4	632 648 0328	CONNECTOR, JUMPER LEAD, 8P	1
CP5	632 648 0298	CONNECTOR, JUMPER, 4P	1
CP6	632 648 0304	CONNECTOR, JUMPER, 5P	1
CP7	632 648 0311	CONNECTOR, JUMPER 7P	1
CP8-CP9 CP15	632 648 0342	CONNECTOR, JUMPER 12P	3
CP10	632 251 7745	PLUG, 5P   \$	1
CP11	632 251 7653	PLUG, 2P   \$	1
CP12	632 253 9211	PLUG, 2P	1
CP13	632 648 0489	CONNECTOR, 14P	1
CP14	632 531 3733	CONNECTOR, 16P	1

Ref. No.	PART No.	DESCRIPTION	Qty
CP16	632 648 0335	CONNECTOR, JUMPER 10P	1
CP17	632 253 7828	PLUG, 2P	1
IC1	410 259 6607	IC UPD75217CW-254	1
IC2	409 336 8405	IC LC3564S-10, RAM	1
IC3, IC4	409 257 6405	IC LB1233ST, PRINT DRIVE	2
IC3, IC4	409 019 7909	IC LB1233, PRINT DRIVE	2
IC5	409 085 4406	IC LB1235 STAMP, REWIND, DRAWER	1
IC6	409 287 1807	IC SN74HC132N PWD, RES CIRCUIT	1
IC6	409 186 3001	IC TC74HC132AP	1
IC7	409 174 9800	IC AN78N06	1
IC7	409 027 0206	IC L78N06	1
IC8	409 208 0803	IC TC74HC367AP RAM EXPAN. (OPTION)	1
Q1	405 043 4006	TR 2SD1684-S	1
Q3	405 053 1309	TR 2SD1825	1
Q4	405 038 6909	TR 2SA1528-AA	1
Q5, Q8-Q9	405 073 6209	TR 2SC3917-AC	3
Q6	405 080 0900	TR 2SC3919-AC	1
Q11	405 018 2709	TR 2SC3401-AC	1
Q2, Q7	405 006 9505	TR 2SB1134-S	2
Q10	405 018 0101	TR 2SC3331-T-AA	1
	632 734 7057	BAND, WIRE for Q2-Q3	1
ZD1	407 050 4703	ZENER DIODE GZA5.1X	1
ZD2	407 050 0309	ZENER DIODE GZA27X	1
ZD3	407 050 7605	ZENER DIODE GZA9.1X	1
ZD4	407 049 6206	ZENER DIODE GZA12X	1
ZD5	407 049 7609	ZENER DIODE GZA16Z	1
D1-D4	407 072 0202	DIODE DSF10TE-AT1	4
D5-D7	407 005 4703	DIODE DS446-AT1	3
D9, D33	407 005 3805	DIODE DS442-AT	2
D10-D12 D13-D20 D26-D31 D38	407 007 9904	DIODE GMA01-AT	16
D32	407 004 9600	DIODE DSF10TC-AT1	1
C1   △	404 060 4600	MT-POLYEST 0.047U M 250V	1
C2	403 062 0009	POLYESTER 0.047U J 50V	1
C3	403 306 1908	ELECT 3300U M 35V	1
C4	403 306 2004	ELECT 1U M 50V	1
C5	403 056 7502	POLYESTER 1000P J 50V	1
C6	403 306 2103	ELECT 2.2U M 50V	1
C7	403 306 2202	ELECT 10U M 50V	1
C8	403 306 2301	ELECT 220U M 16V	1
C9, C23	403 306 4701	ELECT 22U M 16V	2
C10	403 306 2905	ELECT 100U M 10V	1
C11	403 306 4800	ELECT 33U M 16V	1
C12	403 306 4909	ELECT 3.3U M 50V	1
C13	403 017 7503	CERAMIC 22P J 50V	1
C14	403 022 6003	CERAMIC 33P J 50V	1
C15	403 306 2707	ELECT 10U M 35V	1
C16, C19 C17, C20 C29-C31 C34	403 306 2004	ELECT 1U M 50V	2
	403 001 3009	CERAMIC 0.1U M 16V	6
C18, C21	403 072 7708	CERAMIC 330P K 50V	2
C22	403 002 1905	CERAMIC 0.01U K 25V	1

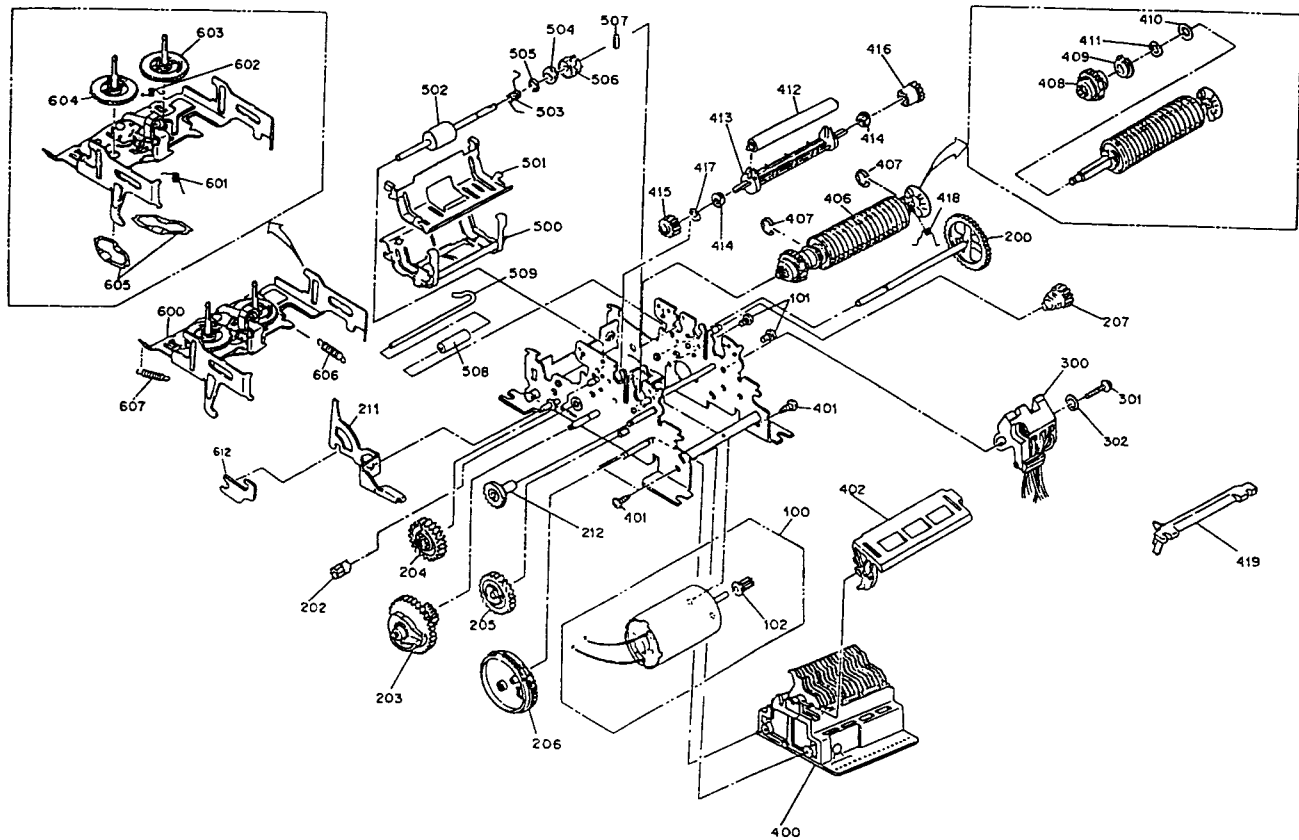
NOTES : 1. Part orders must contain Model Number, Part Number and Description.  
2. Ordering quantity of screws and resistors must be multiple of 10 pcs.

Ref. No.	PART No.	DESCRIPTION	Qty
C32	403 002 4302	CERAMIC 0.1U M 25V	1
C24	403 306 2806	ELECT 22U M 35V	1
C33	407 107 9507	VARISTOR MFC08D150M	1
R1	401 007 5201	CARBON 12K JA 1/2W	1
R2, R39	401 008 0700	CARBON 180 JA 1/2W	2
R3, R5	401 024 7707	CARBON 100K JA 1/6W	2
R4	401 009 2901	CARBON 3.3 JA 1/2W	1
R6	401 024 6403	CARBON 10 JA 1/6W	1
R7	401 026 3905	CARBON 330 JA 1/6W	1
R8	401 027 5908	CARBON 68K JA 1/6W	1
R17, R18 R33, R42	401 026 9907	CARBON 4.7K JA 1/6W	4
R19, R30	401 026 4308	CARBON 3.3K JA 1/6W	2
RA3	632 755 8408	RESISTOR BLOCK, 47K X 8	1
RA4	632 755 2819	RESISTOR BLOCK, 22K X 6	1
<b>PC BOARD 2</b>			
36	632 755 2024	PW BOARD ASS'Y, M2 FRONT	1
	632 644 2609	FLUORESCENT TUBE, 9-MT-94G	1
	632 754 9826	JUMPER LEAD, 12P, 200MM	2
<b>PC BOARD 3</b>			
37	632 755 2031	PW BOARD, ASS'Y M3 REAR	1
	632 644 2609	FLUORESCENT TUBE, 9-MT-94G	1
	632 754 9949	JUMPER LEAD, 8P, 650MM, CP4	1
	632 754 9963	JUMPER LEAD, 4P, 650MM, CP5	1
	632 754 9970	JUMPER LEAD, 5P, 650MM, CP6	1
	632 754 9987	JUMPER LEAD, 7P, 650MM, CP7	1
<b>KEYBOARD</b>			
38	632 647 8165	KEYBOARD, 4-DEPT. (USA)	1
38	632 647 8189	KEYBOARD, 8-DEPT (GENERAL/CANADA/GERMAN)	1
39	632 763 0241	KEY SHEET ASS'Y, ENG. 4-DEPT	1
	632 650 2259	KEY SHEET, ARROW	1
	632 650 2266	KEY SHEET, @/FOR/TIME	1
	632 650 2334	KEY SHEET, PLU	1
	632 650 2396	KEY SHEET, CLEAR	1
	632 650 2372	KEY SHEET, VOID	1
	632 650 2303	KEY SHEET, SHIFT 1	1
	632 650 2358	KEY SHEET, -/NET ST	1
	632 650 2310	KEY SHEET, % 1	1
	632 650 2525	KEY SHEET, 1	1
	632 650 2549	KEY SHEET, 2	1
	632 650 2556	KEY SHEET, 3	1
	632 650 2563	KEY SHEET, 4	1
	632 650 2365	KEY SHEET, RECD ACCT	1
	632 665 8796	KEY SHEET, PAID OUT	1
	6326502341	KEY SHEET, #/NS	1
	632 650 2280	KEY SHEET, CHARGE	1
	632 650 2273	KEY SHEET, ST ALL	1
	632 650 2501	KEY SHEET, AMT TEND/CASH	1
	632 650 2297	KEY SHEET, CHEQUE	1
	411 025 7507	SCR S-TPG FLT 2.6 X 8	2
39	632 755 4677	KEY SHEET ASS'Y, ENG. 8-DEPT	1
	632 650 2259	KEY SHEET, ARROW	1
	632 650 2266	KEY SHEET, @/FOR/TIME	1

Ref. No.	PART No.	DESCRIPTION	Qty
	632 650 2334	KEY SHEET, PLU	1
	632 650 2396	KEY SHEET, CLEAR	1
	632 650 2372	KEY SHEET, VOID	1
	632 650 2303	KEY SHEET, SHIFT 1	1
	632 650 2358	KEY SHEET, -/NET ST	1
	632 650 2310	KEY SHEET, % 1	1
	632 650 2426	KEY SHEET, 1	1
	632 650 2433	KEY SHEET, 2	1
	632 650 2440	KEY SHEET, 3	1
	632 650 2457	KEY SHEET, 4	1
	632 650 2464	KEY SHEET, 5	1
	632 650 2471	KEY SHEET, 6	1
	632 650 2488	KEY SHEET, 7	1
	632 650 2495	KEY SHEET, 8	1
	632 650 2365	KEY SHEET, RECD ACCT	1
	632 665 8796	KEY SHEET, PAID OUT	1
	6326502341	KEY SHEET, #/NS	1
	632 650 2280	KEY SHEET, CHARGE	1
	632 650 2273	KEY SHEET, ST ALL	1
	632 650 2501	KEY SHEET, AMT TEND/CASH	1
	632 650 2297	KEY SHEET, CHEQUE	1
	411 025 7507	SCR S-TPG FLT 2.6 X 8	2
39	632 648 5170	KEY SHEET ASS'Y, GER. 8-DEPT	1
	632 650 2259	KEY SHEET, ARROW	1
	632 655 8775	KEY SHEET, X/UHR	1
	632 650 2334	KEY SHEET, PLU	1
	632 655 8928	KEY SHEET, LOESCHEN	1
	632 655 8782	KEY SHEET, STORNO	1
	632 650 2303	KEY SHEET, SHIFT 1	1
	632 655 8874	KEY SHEET, NETTO-ZW	1
	632 650 2310	KEY SHEET, % 1	1
	632 650 2426	KEY SHEET, 1	1
	632 650 2433	KEY SHEET, 2	1
	632 650 2440	KEY SHEET, 3	1
	632 650 2457	KEY SHEET, 4	1
	632 650 2464	KEY SHEET, 5	
	632 650 2471	KEY SHEET, 6	
	632 650 2488	KEY SHEET, 7	
	632 650 2495	KEY SHEET, 8	
	632 655 8836	KEY SHEET, EIN-ZAHLUNG	1
	632 655 8942	KEY SHEET, AUS-ZAHL/RETOUR	1
	632 655 8904	KEY SHEET, #/KV	1
	632 655 8805	KEY SHEET, KREDIT	1
	632 655 8812	KEY SHEET, ZW-SUMME	1
	632 655 8829	KEY SHEET, SCHECK	1
	632 655 8768	KEY SHEET, BAR	1
	411 025 7507	SCR S-TPG FLT 2.6 X 8 for MODE SWITCH - KEYBOARD	2

NOTES : 1. Part orders must contain Model Number, Part Number and Description.  
2. Ordering quantity of screws and resistors must be multiple of 10 pcs.

## 19. PRINTER EXPLODED VIEW / PARTS LIST



EXPLODED DIAGRAM FOR M-405R

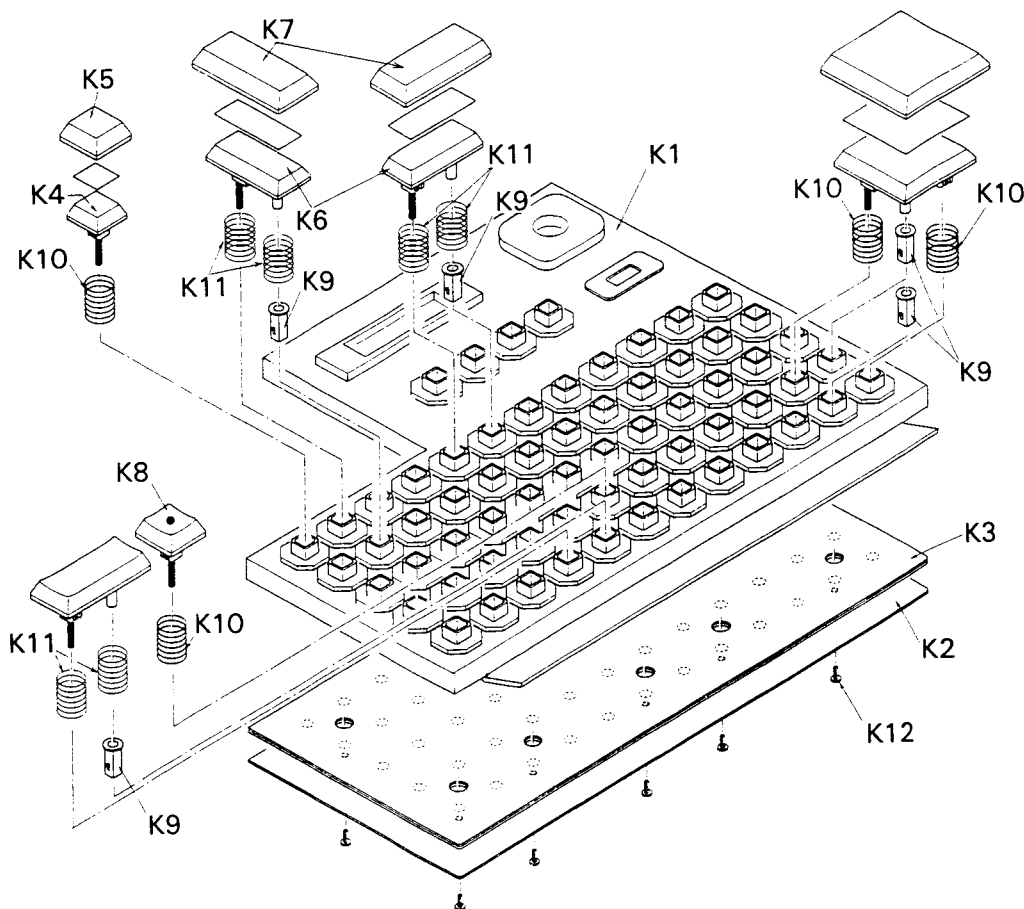
Ref. No.	PART No.	DESCRIPTION	Qty
<b>PRINTER</b>			
100	632 652 4046	DC MOTOR ASS'Y	1
102	632 652 4053	GEAR, FIRST REDUCTION	1
101	411 001 8405	SCR BIN 3 X 3	2
200	632 651 8397	GEAR, SECOND REDUCTION	1
202	632 564 8958	GEAR, THIRD REDUCTION	1
203	632 577 0666	GEAR, CAM	1
204	632 544 4062	GEAR, PRINT TRANSMISSION	1
205	632 544 4086	GEAR, INTMTNT TRANSMISSION	1
206	632 564 8989	GEAR, INTERMITTENT	1
207	632 564 9009	GEAR, PAPER FD TRANSMISSION	1
211	632 651 8403	LEVER, RIBBON FEED DRIVE	1
212	632 564 9078	GEAR, SELECTIVE TRANSMISSION	1
300	632 780 4352	DETECTOR, T	1
301	411 041 0704	SCR PAN 3 X 18	1
302	411 170 6202	WASHER Z 3.2X7.3X0.3	1
400	632 652 4077	SOLENOID ASS'Y, CHARCTR SEL	1
401	411 070 6609	SCR TPG BIN 3X8	2
402	632 780 4376	LEVER, RESET 1	1
406	632 780 4413	WHEEL, PRINT	1
407	411 001 0300	RING E 5	2
408	632 564 9139	GEAR, SELECTIV	1
409	632 544 4499	HOLDER, PRINT WHEEL SHAFT	1
410	411 129 3504	WASHER Z 6X12X0.7	1
411	412 054 6301	SPECIAL WASHER	1
412	632 567 2571	PLATEN, C	1

413	632 564 9160	HOLDER	1
414	632 544 4567	HOLDER, CRANK SHAFT	2
415	632 651 8564	GEAR, PRINTING	1
416	632 544 4581	GEAR, PPR FD FRST TRANSMIT	1
417	411 129 3405	WASHER CON-SW 3	1
418	632 544 4604	TORSION SPRING, SLIT MASK	1
419	632 652 4091	GUIDE, PRINT WHEEL	1
500	632 780 4383	GUIDE, OUTER PAPER	1
501	632 564 9238	GUIDE, INNER PAPER	1
502	632 564 9245	ROLLER, PAPER FEEDING	1
503	632 544 4666	TORSION SPRING, RLR SHAFT	1
504	632 544 4772	HOLDER, PAPER FEED SHAFT	1
505	411 000 9601	RING E 2.3	1
506	632 544 4789	GEAR, PAPER FEEDING	1
507	411 129 3207	PIN SPRING, 1.5X6	1
508	632 564 9252	ROLLER, PAPER HOLDING	1
509	632 564 9269	WIRE SPRING, PAPER HOLDING	1
600	632 651 8571	INK RIBBON ASS'Y	1
601	632 564 9276	COIL SPRING, RBN DTCT LVR	1
602	632 564 9283	COIL SPRING, RBN FD PAWL	1
603	632 544 4918	GEAR, SPOOL, T	1
604	632 544 4925	GEAR, SPOOL, S	1
605	632 544 4932	PLATE SPRING, SPL GEAR BRK	2
606	632 544 4949	COIL SPRING, RIBBON SHIFT	1
607	632 544 4956	COIL SPRING, RBN FD LEVER	1
612	632 652 4114	STOPPER, RIBBON FRAME	1

- NOTES : 1. Part orders must contain Model Number, Part Number and Description.  
2. Ordering quantity of screws and resistors must be multiple of 10 pcs.



## 20. KEYBOARD EXPLODED VIEW / PARTS LIST



### 4-DEPT

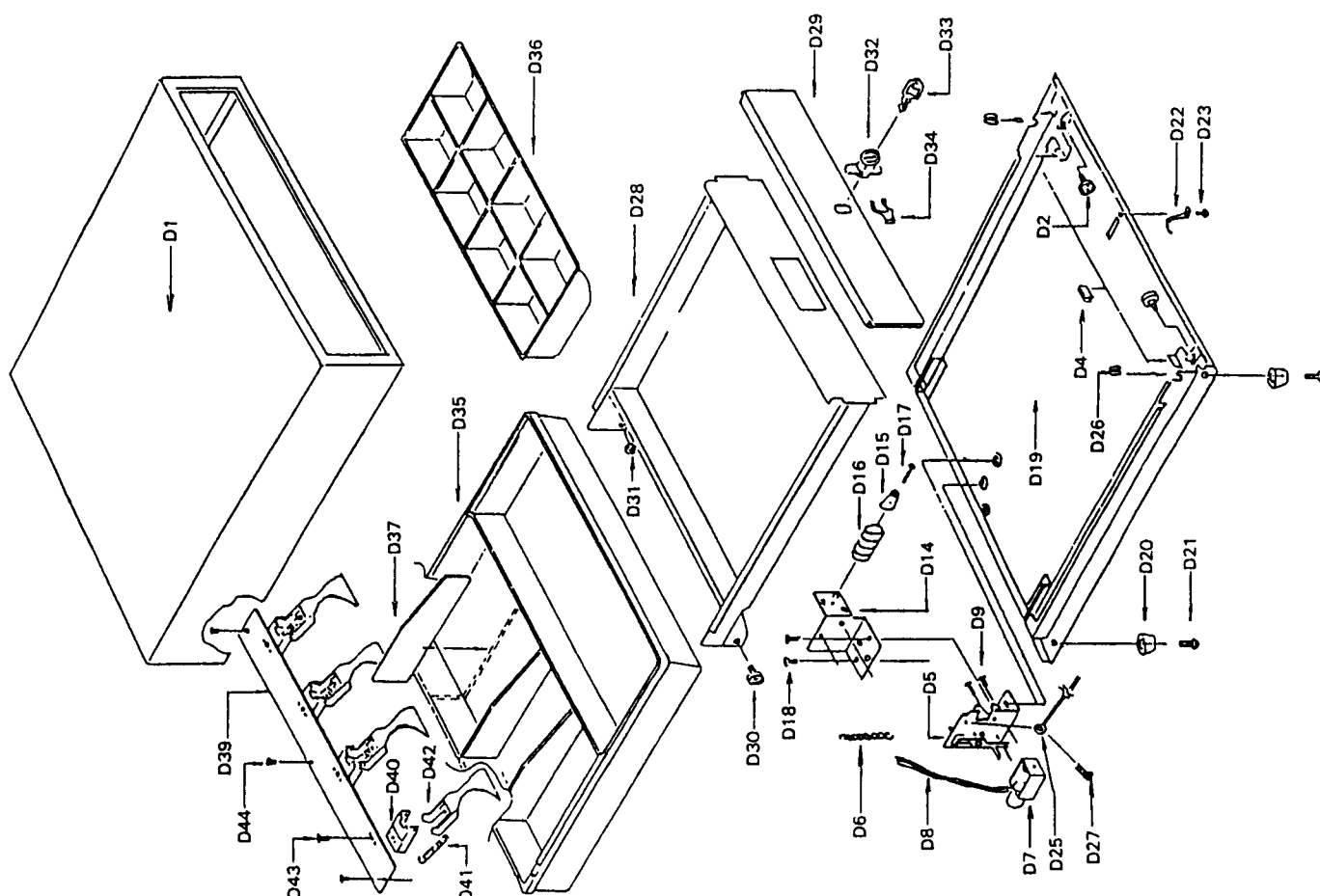
Ref. No.	PART No.	DESCRIPTION	Qty
K1	632 655 8225	FRAME, KEY	1
K2	632 655 8232	PLATE	1
K3	632 655 8249	SHEET ASS'Y, FILM	1
K4	632 655 8256	KEY TOP, SMALL	14
K5	632 655 8263	CAP, KEY SMALL	14
K6	632 655 8270	KEY TOP, MIDDLE	5
K7	632 655 8287	CAP, KEY MIDDLE	5
	632 655 8294	KEY TOP, LARGE	
	632 655 8300	CAP, KEY LARGE	
	632 677 4359	KEY TOP, 1	1
	632 677 4366	KEY TOP, 2	1
	632 677 4373	KEY TOP, 3	1
	632 677 4427	KEY TOP, 4	1
	632 677 4458	KEY TOP, 5	1
	632 677 4465	KEY TOP, 6	1
	632 677 4489	KEY TOP, 7	1
	632 677 4496	KEY TOP, 8	1
	632 677 4502	KEY TOP, 9	1
	632 677 4328	KEY TOP, 0	1
	632 677 4335	KEY TOP, 00	1
K8	632 677 4342	KEY TOP, .	1
K9	632 655 8430	GUIDE	5
K10	632 655 5743	COIL SPRING	26
K11	632 655 8447	COIL SPRING	10
K12	411 155 2007	SCR TPG BIN 2X5	12

### 8-DEPT

Ref. No.	PART No.	DESCRIPTION	Qty
K1	632 655 8225	FRAME, KEY	1
K2	632 655 8232	PLATE	1
K3	632 655 8249	SHEET ASS'Y, FILM	1
K4	632 655 8256	KEY TOP, SMALL	22
K5	632 655 8263	CAP, KEY SMALL	22
K6	632 655 8270	KEY TOP, MIDDLE	1
K7	632 655 8287	CAP, KEY MIDDLE	1
	632 655 8294	KEY TOP, LARGE	
	632 655 8300	CAP, KEY LARGE	
	632 677 4359	KEY TOP, 1	1
	632 677 4366	KEY TOP, 2	1
	632 677 4373	KEY TOP, 3	1
	632 677 4427	KEY TOP, 4	1
	632 677 4458	KEY TOP, 5	1
	632 677 4465	KEY TOP, 6	1
	632 677 4489	KEY TOP, 7	1
	632 677 4496	KEY TOP, 8	1
	632 677 4502	KEY TOP, 9	1
	632 677 4328	KEY TOP, 0	1
	632 677 4335	KEY TOP, 00	1
K8	632 677 4342	KEY TOP, .	1
K9	632 655 8430	GUIDE	1
K10	632 655 5743	COIL SPRING	34
K11	632 655 8447	COIL SPRING	2
K12	411 155 2007	SCR TPG BIN 2X5	12

NOTES : 1. Part orders must contain Model Number, Part Number and Description.  
2. Ordering quantity of screws and resistors must be multiple of 10 pcs.

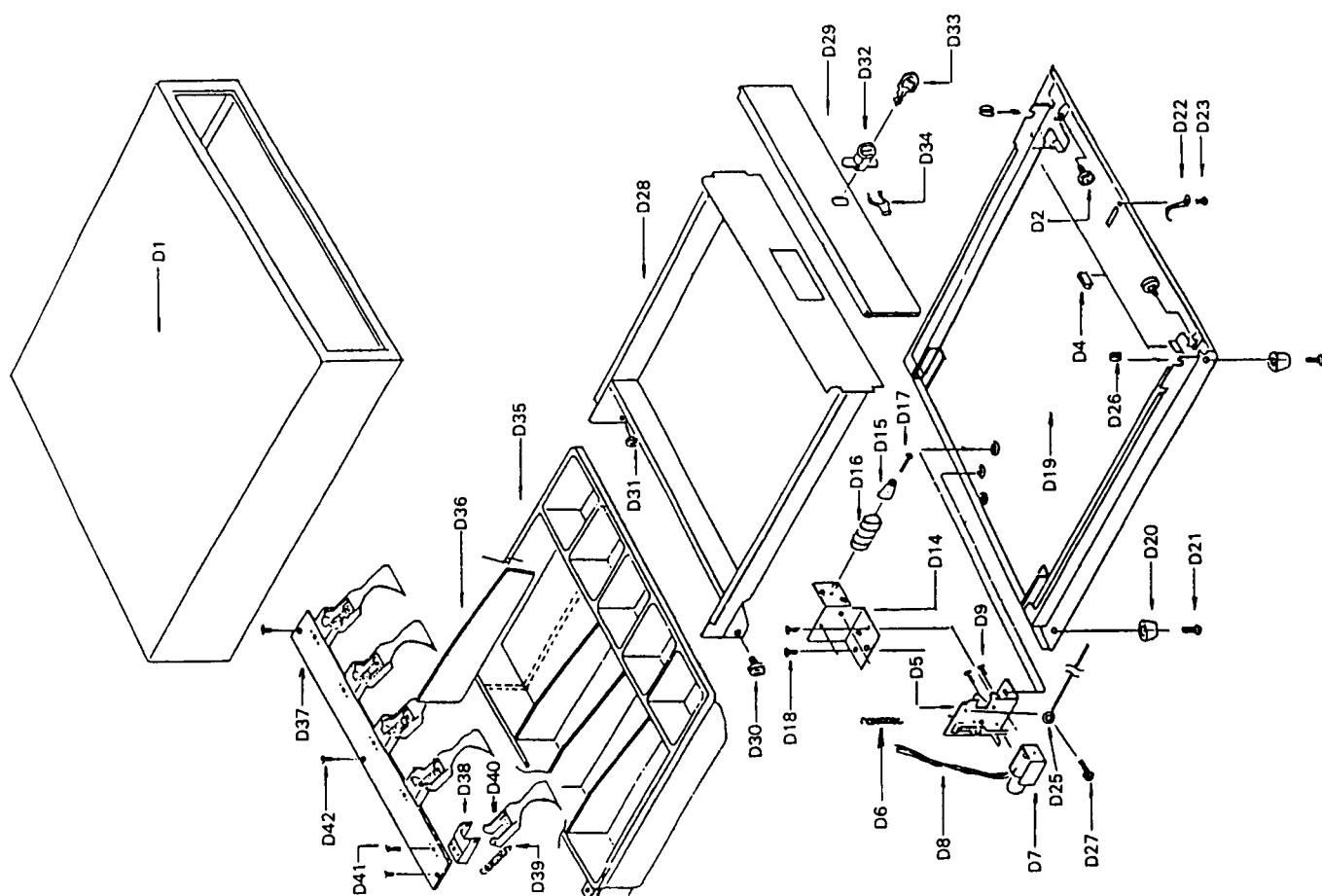
## 21. DRAWER EXPLODED VIEW / PARTS LIST



Ref. No.	PART No.	DESCRIPTION	Qty
<b>DRAWER 4B8C</b>			
D1	632 669 8495	COIN CASE	1
D2	632 669 8501	ROLLER	2
D4	632 637 9042	CUSHION, RUBBER	2
D5	632 669 8518	BRACKET	1
D6	632 637 9103	COIL SPRING	1
D7	632 723 0779	SOLENOID, 15V	1
D8	632 637 9158	WIRE	2
D9	411 045 5408	SCR PAN+SW 3X5	2
D14	632 669 8525	CHASSIS	1
D15	632 637 9219	STOPPER, RUBBER	1
D16	632 637 9226	COIL SPRING	1
D17	411 131 5404	SCR S-TPG BIN 3X15	1
D18	411 151 8300	SCR S-TPG PAN+SW 4X8	2
D19	632 669 8532	PLATE, BOTTOM	1
D20	632 637 9240	BASE, RUBBER	4
D21	411 120 7204	SCR S-TPG BIN 4X15	4
D22	632 637 9257	PLATE SPRING, EARTH	1
D23	411 047 7509	SCR PAN+FLG 3X6	1
D25	632 637 9288	EARTH WIRE	1
D27	411 045 5408	SCR PAN+SW 3X5	1
D26	632 669 8556	BUSHING	2

Ref. No.	PART No.	DESCRIPTION	Qty
	632 680 4704	BOX ASS'Y	1
D28	632 669 8600	BOX	1
D29	632 680 4711	PLATE	1
D30	632 669 8501	ROLLER	2
D31	411 055 2602	NUT HEX+CON-SW 6	2
D32	632 637 9325	LOCK	1
D33	632 637 9332	KEY	2
D34	632 637 9349	PLATE SPRING	1
	632 780 0637	TILL ASS'Y	1
D35	632 637 9523	COIN CASE	1
D36	632 780 0903	CASE, COIN	1
D37	632 637 9370	PARTITION PLATE	3
D39	632 637 9387	PLATE	1
D42	632 637 9394	CLIP	4
D41	632 637 9400	COIL SPRING	4
D40	632 637 9424	BRACKET, PAPER MONEY	4
D43	411 023 8803	SCR S-TPG PAN 3X6	4
D44	411 023 8803	SCR S-TPG PAN 3X6	3
	632 251 9442	HOUSING, 5P	1
	632 287 0857	TERMINAL	3
	632 759 0699	LABEL, ECB05G-72M	1

NOTES : 1. Part orders must contain Model Number, Part Number and Description.  
2. Ordering quantity of screws and resistors must be multiple of 10 pcs.



Ref. No.	PART No.	DESCRIPTION	Qty
<b>DRAWER 5B5C</b>			
D1	632 669 8495	COIN CASE	1
D2	632 669 8501	ROLLER	2
D4	632 637 9042	CUSHION, RUBBER	2
D5	632 669 8518	BRACKET	1
D6	632 637 9103	COIL SPRING	1
D7	632 723 0779	SOLENOID, 15V	1
D8	632 637 9158	WIRE	2
D9	411 045 5408	SCR PAN+SW 3X5	2
D14	632 669 8525	CHASSIS	1
D15	632 637 9219	STOPPER, RUBBER	1
D16	632 637 9226	COIL SPRING	1
D17	411 131 5404	SCR S-TPG BIN 3X15	1
D18	411 151 8300	SCR S-TPG PAN+SW 4X8	2
D19	632 669 8532	PLATE, BOTTOM	1
D20	632 637 9240	BASE, RUBBER	4
D21	411 120 7204	SCR S-TPG BIN 4X15	4
D22	632 637 9257	PLATE SPRING, EARTH	1
D23	411 047 7509	SCR PAN+FLG 3X6	1
D25	632 637 9288	EARTH WIRE	1
D27	411 045 5408	SCR PAN+SW 3X5	1
D26	632 669 8556	BUSHING	2

Ref. No.	PART No.	DESCRIPTION	Qty
	632 680 4704	BOX ASS'Y	1
D28	632 669 8600	BOX	1
D29	632 680 4711	PLATE	1
D30	632 669 8501	ROLLER	2
D31	411 055 2602	NUT HEX+CON-SW 6	2
D32	632 637 9325	LOCK	1
D33	632 637 9332	KEY	2
D34	632 637 9349	PLATE SPRING	1
	632 670 1768	TILL ASS'Y	1
D35	632 670 0457	COIN CASE	1
D36	632 637 9370	PARTITION PLATE	4
D37	632 637 9387	PLATE	1
D40	632 637 9394	CLIP	5
D39	632 637 9400	COIL SPRING	5
D38	632 637 9424	BRACKET, PAPER MONEY	5
D41	411 023 8803	SCR S-TPG PAN 3X6	5
D42	411 023 8803	SCR S-TPG PAN 3X6	3
	632 251 9442	HOUSING, 5P	1
	632 287 0857	TERMINAL	3
	632 759 0682	LABEL, ECB05G-71M	1

NOTES : 1. Part orders must contain Model Number, Part Number and Description.  
2. Ordering quantity of screws and resistors must be multiple of 10 pcs.

